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W. J. JOHNSTON, President. F. J. PRATT, Treasurer.

T. A. RICKARD . . . . . EDITOR

FREDERICK HOBART, JOSEPH STRUTHERS, SAMUEL SANFORD . . . . . Associate Editors

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WE ARE GLAD to note that our contemporary, the *Mining Investor*, of Colorado Springs, has been successful in its attack upon dishonest stock operations, and that a jury sitting at St. Louis found the Wernses and their associates guilty of using the United States mails for fraudulent purposes. Coming soon after the Letson Balliet episode, it is to be hoped that this decision will deter others from the pestilential distribution of lures to get rich suddenly in poor mining schemes.

⚒

THEY HAVE GOT it in Maine—not the bubonic plague—but "another Cripple Creek"! A large advertisement in the Westbrook *Chronicle-Gazette* retails the familiar story of a mineral belt, miles long, just seamed with true-fissure veins, with millions of tons of rich ore in sight all developed recently by the herculean labors of six miners. "Expert mineralogists" have expressed their dictum and "expert mining engineers" have advocated the erection of a large plant. At a depth of 8 feet the ore assayed $7.50 per ton; at 15 feet, $14.51; at 32 feet $17.81, and the last assay return was $33.32—at which point, it is presumed, work was temporarily suspended pending the settlement of the currency question!

⚒

SOME OF OUR friends in Eastern Massachusetts and in Maine will be interested in knowing that the problem of extracting gold from sea-water has not been given up. A British patent was recently issued to William Henry Martin for a method of precipitating such gold in a "cheap, simple and effective manner." It is not necessary to give the details here; we may say, however, that no mention is made of the insertion of amalgam in the precipitating boxes—the plan which Rev. Dr. Jernegan found so "simple," and also so "efficient"—in selling stock.

IN OUR issue of February 7 we gave the text of a bill to amend the United States Mining Law, prepared by Mr. W. H. McKinlay, with some comments thereon. We are now informed that the bill has been introduced in the House of Representatives, and has been referred to a committee, the members of which are Frank E. Eddy, of Minnesota, chairman; William Connell, of Pennsylvania; Carlos D. Shelden, of Michigan; Malcolm A. Moody, of North Carolina; Webster E. Brown, of Wisconsin; George R. Patterson, of Pennsylvania; Charles F. Scott, of Kansas; Charles H. Burke, of South Dakota; Farish Carter Tate, of Georgia; Thomas L. Glenn, of Idaho; Caldwell Edwards, of Montana; John Wesley Gaines, of Tennessee; Alexander Billmeyer, of Pennsylvania, and Mark A. Smith, of Arizona. It is to be hoped that the committee will take action soon, as the time remaining at the present session is very short.

⚒

The annual report of the Tennessee Copper Company will interest many. As regards costs, the figures for blast furnace practice indicate the degree of efficiency attained. The total is only $1.05, which may be roughly subdivided as follows: Coke 0.15 tons at $4.20 63 cents; flux, 0.13 tons at 90 cents, 12 cents; labor, 0.14 days at $1.52, 21 cents; coal for power, and other supplies, 9 cents. We are informed that the increased price of coke, due to the activity of the iron market, has tended to raise the costs. With coke at the ordinary price of $3.20 per ton, the blast furnace expense would be in the neighborhood of 90 cents per ton.

The Tennessee Copper Company is one of the few undertakings of which it can be said that the original scheme and the execution of it have both been carried out by technical men. Mr. Randolph Adams, formerly manager of the Central Mine at Broken Hill, Australia, Mr. J. Parke Channing and Mr. W. A. Heywood are entitled to the congratulations of their professional friends.

⚒

WE HEAR complaints in regard to the increase in the taxation of mines in Mexico, due in part to the greater value of a kilogram of gold as measured in silver. This has resulted in an addition of 20 to 50 cents net per ton in operating expenses, according to the nature of the ore. It is a serious matter, especially as it comes at a time when Mexican mines are attracting so much foreign capital, and the Republic is feeling the consequent stimulation of all its industrial activities. At the present time a gold mine, situated close to the railroad, has to meet an amount in taxation, commissions and expressage on its bullion aggregating about 9 to 10 per cent on the value of its gross production. With greater distance from the railroad this deduction is proportionately augmented. It will be advisable for the mine owners in Mexico to organize so as to take concerted action with a view to bettering existing conditions. Nothing can be done by individual effort, because the legislators are *haciendados*, whose property is in land and *rancherias*, which escape

heavy taxation. We sincerely hope that the Republic will not repeat the old story—the killing of the goose that laid the golden eggs.

⚒

THE DECISION of the New Jersey Court of Errors and Appeals, in the Hodge case, sets aside the injunction granted by the Court of Chancery, and removes the last legal obstacle to the issue of $200,000,000 bonds by the United States Steel Corporation, to replace an equal amount of preferred stock. As the opinion of the Court has not yet been published, the grounds for the decision cannot be given; but they are, presumably, similar to those on which the decision in the previous case against the corporation was based.

It is reported that the United States Corporation will not take advantage of this decision, and that the issue will not be made. No official statement has been made on this point, but it is to be hoped that the reports are correct. We have heretofore pointed out the weakness of a policy which would substitute fixed obligations for stock in an industrial corporation. If the managers of the Steel Corporation realize that the proposed conversion will be a mistake, we believe that it will be in the end much better for the company.

⚒

AMERICAN INSTITUTE OF MINING ENGINEERS.

The forthcoming meeting at Albany, beginning on Tuesday, February 17, promises to be very successful. A large number of members have signified their intention of being present. The papers announced to be read and discussed cover the usual wide range of subjects, but particular attention will be directed to the application of electricity in mining and metallurgy, this being appropriate to the place of meeting, where, in the vicinity, there are large electric installations, the visits to which will form a notable feature of the convention.

Among those who will attend are several of the chiefs of the United States Geological Survey, contact with whom is always stimulating to men from the mines, and at this meeting, as at all similar gatherings, there will be an opportunity for the informal discussions between men having kindred pursuits which is after all the most useful outcome of these pleasant occasions.

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CONCENTRATION BY OIL.

We have received a great many inquiries, from time to time, concerning the use of oil in concentration. In this issue, and in that which will follow, we publish an authoritative account of the process at the hands of so well-known an engineer as Mr. Walter McDermott. We trust that his careful description of details, both in regard to the principles and the mechanical application of the process, will prove serviceable to our readers.

Oil concentration, like cyanidation, has suffered at the hands of some of its friends. It used to be said of the cyanide process when it first came out, that all you needed was a barrel of water, a chunk of cyanide and the ore to be treated—the process did the rest! There have been similar simple directions offered for the application of oil to the concentration of ores and we are aware of numerous rough experiments made by individuals who were ignorant of the elementary principles which necessarily restricted the application of the process. Many unsuccessful tests have been made in the West and elsewhere, partly because of incorrect methods were employed and partly because the ores were radically unsuited to the process. Mr. McDermott states, for example, that old mill tailings and the weathered material of dumps, which are usually the first to be used in experiments of this kind, are not amenable to this treatment. In the end, like all metallurgical processes, concentration by oil has well defined limitations and the sooner we know them the better, because we thereby prevent waste of energy in the wrong direction and hasten progress along the lines of possible advance.

⚒

ORE OUT OF SIGHT.

In this issue we publish a useful contribution by Mr. Philip Argall, upon a matter which deeply concerns all mining engineers. The term suggested by him to cover the ore proved to exist in the workings of a mine can be contrasted with the definition brought forward by the council of the Institution of Mining and Metallurgy, London, in their circular as published in our issue of October 18. It is very probable that Mr. Argall's definition will elicit discussion on the part of others to whom the matter is of practical importance. We trust this will be the case. While it is unlikely that every one will agree to use exactly the same terms, it is becoming evident, as the light of intelligence is thrown upon the phrase, "ore in sight," that it not only fails to be descriptive, but it is misleading, especially to the average investor in mines who is apt to take it in its literal and most obvious sense. No word or phrase will exactly cover the varying degree of certainty obtainable concerning the existence of a certain amount of ore in a mine, or in the different portions of it, because in its ultimate significance only ore in the bins is "in sight"—that is, your ore is *in sight* when you have actually taken it out of the mine. This discussion, however, brings out very clearly the need for precision of language in mine reports, and whether an engineer uses one term or another he should always be at pains to explain just what he does mean. After all, the primary purpose of a report as made by a mining engineer is to state facts as lucidly as possible and in terms which cannot be misunderstood by the person at whose request and expense it has been prepared. It is better to go into details of explanation than to mislead, unconsciously, by the use of terms which are capable of several shades of meaning.

⚒

RECENT PAPERS ON ORE DEPOSITION.

Mining engineers are again indebted to geologists for illuminating suggestions concerning ore deposition. The recent publication of the papers of Messrs. Kemp, Spurr and Weed, dealing with the genetic relation between igneous rocks and metallic ores, marks another important advance in a study which presents equal interest to the philosopher and the miner.

A change has swept over the trend of scientific theory in regard to the origin of ores. Not long since we were transported with the idea of water action, now we differentiate in magmas. Time restores the balance of things. Ten years ago Prof. Posepny started a discussion which emphasized the importance of aqueous agencies in the distribution of ores; this was followed by an era of investigation into underground waterways, the effects induced by surface drainage and the maintenance of subterranean circulation by gravitative stress; this development of the science was fitly accentuated by the philosophic deductions of Prof. Van Hise, supplemented by the practical inference made on the subject of secondary enrichments by Messrs. Emmons, Weed and others.

During this period there were several investigators who chafed under the undue prominence given to aqueous agencies and demurred to the obvious neglect of a fundamental factor in the genesis of ore-deposits—a factor long recognized by the miner in his proverbial fondness for "porphyry" as a favorable association for rich mines. While our American authorities were waxing enthusiastic over the work of Posepny, Prof. Vogt was making a careful inquiry into the differentiation of rock magmas and had come to the conclusion that the normal terrestrial water circulation played a minor part in the primary origin of certain deposits, however much it may have affected their later concentration, from such portions of the magma as were rich in metals, along the contact with sedimentary rocks. When Prof. Van Hise elucidated the principles controlling the underground circulation of waters near the earth's exterior as the determining factor in the great process of ore formation, Prof. Kemp pointed out that the greater number of deposits of gold, silver and copper ores, as known to-day, are near igneous rocks with which he believed them to be genetically connected. A discussion arose between Professors Van Hise and Kemp which served a most useful purpose and was followed with keen interest by the mining fraternity.

Before this interesting controversy occurred Mr. J. E. Spurr, in his examination of the Yukon District, in Alaska, had become impressed with the evidence of ore-segregation afforded by a series of closely related rocks in the Forty-Mile region, and in his report, published three years ago, he announced a radical departure from accepted views by describing the gold-quartz veins of the Yukon as the end-product of rock-segregation. This he explained as the result of a progressive increase in silification, by means of which a basic hornblendic granite passes into a quartz feldspar rock, termed "alaskite"; the changes continuing until the alaskite resembles a quartzite and is only distinguishable from a typical quartz-vein by small porphyritic crystals of feldspar. Mr. Spurr holds that certain gold-bearing quartz-veins in the Yukon have originated by a process of magmatic segregation, and that they represent merely the siliceous extreme of the process, the final stage of which is marked by a magma so attenuated as to be described as highly heated water heavily charged with silica and other mineral matter, including gold.

These theories have been a stimulant to widespread observation. In the earlier part of last year Prof. Joseph Barrell published the result of his researches into the physical effects of contact metamorphism, affording thereby certain data concerning the liberation of enormous volumes of gas due to the effects of igneous masses upon the sedimentary rocks which they penetrate. He gave also information concerning the mineralogic changes induced by metamorphism, affording valuable hints which other geologists have not been slow to utilize. Mr. W. H. Weed, the indefatigable observer that he is, has applied the views of Vogt and Kemp to particular occurrences of ore which he has examined, with the result—among others—that he has eluci-

dated the particular conditions which render the contacts of igneous and sedimentary rocks such a favorable *locus* for ore occurrence. This he has found to arise from the fact that the sedimentary strata are made porous by thermal metamorphism, which may be compared to the results produced by burning a clay into a brick. Finally, Prof. Kemp has followed up his argument for the derivation of ores directly from a magma and has pointed to the activity which vulcanism is apt to give to thermal circulation. His discussion of the distribution of the ground-water in mining regions draws attention to the confused ideas concerning water distribution underground, a confusion due, we believe, to the fact that the ground-water level is artificially depressed by shafts and other mine workings.

The papers recently presented to the American Institute of Mining Engineers and published in abstract in this JOURNAL, will, we trust, incite mining engineers to collect new data so that thereby they may make adequate return for the assistance which the geologists have undoubtedly given them by these recent additions to the literature of a subject, of which it may be said that talk cannot wither nor writing stale its infinite variety.

MARKET CONDITIONS.

The metal markets generally continue strong, and but little change is to be reported, during the week. The demand in almost all lines show no present sign of abatement.

Copper continues to sell well at current prices and slight advances are to be noted. There is still a scarcity of metal for spot delivery and most producers are sold up for some time ahead. Orders from abroad also continue to come in very freely.

Tin continues to fluctuate, but recent changes in prices have not been great. The statement of production and consumption last year, given on another page, shows that the surplus of the metal is necessarily very small and that supplies are not increasing materially.

Business in lead continues steady and at unchanged rates. The consumption continues large.

Spelter remains firm and there appears to be no falling off in the demand. Reports are current that the United States Steel Corporation has been negotiating for the control of the Lanyon smelters; but these rumors do not seem to be based on definite facts.

Silver shows no material change, the demand being about the same. The speculative interest in London has been doing little and apparently the Mexican proposal will have no serious effect upon prices, at any rate for a time.

It is announced that Prof. J. W. Jenks of Cornell University, Edward Brush, of the American Smelting and Refining Company, and Charles A. Conant, of the Morton Trust Company, New York, have accepted an invitation from the Mexican Government to meet and confer with a committee recently appointed by President Diaz to study the monetary situation of that country. They will go to Mexico early in March.

The iron and steel markets have been somewhat more active and buying for the second half of the year has been recently on a considerable scale. Makers of pig iron are still embarrassed by the shortage of coke and difficulty in delivery, resulting from the bad condition of the railroads, and steel mills are consequently delayed in their work. The demand for steel billets is quite active, but has been mostly satisfied with foreign material, which is selling better than for some time past.

In finished material the greatest activity is in structural steel, but buyers find some trouble in getting definite assurances as to delivery on new orders. Agents for foreign material are quite active and it is possible that some important contracts may go abroad.

The Western coal trade continues thoroughly demoralized by transportation conditions. The railroads are still behind, everywhere, on deliveries and local dealers are embarrassed accordingly, while manufacturers find it difficult to get supplies as they are needed.

The protracted struggle between the mine operators and miners of Ohio, Indiana, Illinois and Western Pennsylvania to determine the wage scale for the year beginning April 1, has been settled by the sub-committees appointed at the Indianapolis convention. The settlement is a compromise, the miners gaining a substantial increase for pick and machine mining, and for day labor. The operators granted a slight reduction in the differential between pick and machine work for certain fields, but successfully resisted an attempt to establish a universal run-of-mine system of payment in the competitive field. The operators very strongly opposed this last demand since the run-of-mine system in vogue in Illinois has caused and encouraged careless work and wasteful mining. The settlement of the points of the issue without a strike is a matter for congratulation, though it means higher prices for contract coal to consumers than were made a year ago. Doubtless also this granting of higher wages to bituminous miners will be considered by the Anthracite Arbitration Committee in its decision on the points at issue before it.

The Seaboard bituminous coal trade continues to feel the effects of the large importations of English and Scotch coal, which have greatly reduced speculative prices. The situation as regards domestic coal shows little change. Car supplies continue poor, with apparently no prospect of any improvement.

In the anthracite trade, production is extremely heavy and the market is beginning to get on a strictly weather basis. Prices of coal produced by the independent operators have been down to $5.25, f. o. b. New York shipping ports as compared with $5 by the railroads. Some of the independent operators have already renewed agreements with the railroads, finding it of more advantage to have the latter sell the coal on a basis of 60 per cent of the tidewater price, than to compete for business under present conditions.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

SECONDARY ENRICHMENT AT CRIPPLE CREEK.

To the Editor:

Sir.—The contribution of Mr. Charles J. Moore on this subject, published in your issue of December 27, indicates that there is no uniform horizon with which this copper concentration can be identified. In this connection it would be interesting to learn what is approximately the depth at which the ground-water level occurs in the Blue Bird, Last Dollar, and other mines to which this occurrence of gray copper is referable.

According to the observation of geologists who have made a study of these phenomena, the ground-water rarely extends deeper than 1,200 to 1,500 ft. from surface, and such exceptions as occur are due to faulting, displacement, etc. Since the ground-water in most instances coincides very closely with the zone of secondary enrichment, it follows that a depth of 1,200 ft. to 1,400 ft., at which depth these copper deposits have been noted in some mines of Cripple Creek, must be quite near if not already below the limit of the ground-water. But as, in this district, there exists a volcanic complex in which there is found abundant evidence of successive fracturing, its ground-water level would naturally admit of irregularities, and may have been complicated by dynamic movement.

Returning to the subject of the source of the copper of these concentrations and the difficulty in finding any residual copper minerals in the upper parts of the veins with which the copper enrichments are associated (which difficulty Mr. Moore remarks), I may mention that a case has come under my observation where copper concentrations in a vein which was not in itself copper-bearing, were traceable to ingress of copper-carrying solutions into the main fissure from a system of cross-veins. Whether this note may throw any light on the example under discussion or not, the records of the ore purchased by the United States Reduction and Refining Company, quoted by Mr. Bancroft, showing only .0039 per cent copper contents, would seem to be adequate proof that the telluride ores of Cripple Creek contain copper in very small proportion and goes to prove that some mineral of copper is accessory to the mineral contents of some of these veins. And it seems to me that inasmuch as the copper zone, as far as it has been developed, is localized to parts of two or three mines, these deposits of copper need not imply more than traces of copper as originally present or occurring in the overlying rock mass, to which rock mass and beyond what is now the surface must be added the concentration from the previously superincumbent rock which has been removed through gradual erosion and denudation in the interval of time between the formation of the original ore deposit and the present day. In this manner very inconsiderable copper contents, hardly enough to be discernible in the ordinary way, would be sufficient to form the source of more extensive concentrations than have been so far developed in the Cripple Creek District. And even presuming the extension of the copper zone, which is a new feature of deep mining in Cripple Creek, these deposits may be proven to be a true case of secondary enrichment that is at the same time merely incidental to the gold-tellurium vein system as a whole.

FORBES RICKARD.

Denver, Jan. 28, 1903.

METALLURGICAL PROGRESS AT KALGOORLIE, W. A.

To the Editor:

Sir.—I have read the article by Mr. Alfred James, in your issue of January 3, with much interest. May I be permitted to offer some comment?

The reduction of cost on the principal mines has resulted in a general minimum of 21s. ($5.10) for actual milling and extraction of the ore, although Mr. Marriner of the Main Reef has claimed to have reduced the costs to 18s. ($4.32), but at this mine the three Edwards roasters in use are treating an average of 20 tons per roaster per day as against 12 to 15 tons per day at the Great Boulder Proprietary and Kalgurli Mines. This is owing to the fact that the lode on the Main Reef contains a smaller percentage of sulphur than the mines north of that line. The other roaster in the mill, which is of the vertical turret type, with hand rabbling, is treating an average of about 40

tons per day, at a far greater cost per ton than the Edwards roasters.

The Diehl process at Hannan's Brown Hill, Lake View Consols and Hannan's Star had not, when I left the district, proved itself a success, as the loss of telluride dust during classification in the spitzluten, I was informed, was very considerable, although their extraction was claimed to be 90 per cent. The actual cost of the chemical mixtures must have been very high during the summer months owing to the necessary purchase of considerable quantities of ice. An experimental treatment of 1,500 tons of Golden Link ore at the Hannan's Star in February and March, 1902, was not by any means a success, as a correspondent informs me that the extraction did not exceed 70 per cent, and as the material treated was collected from existing dumps on the Link surface that had been there for something like eighteen months, and therefore more than partially oxidized, the extraction should have been greater. On the Lake View Consols the Diehl process has been installed and additions to the plant were being made when I left.

Referring to the form of agitator employed, i. e., with radial arms on a vertical spindle, I notice that Mr. James states that the raising gear is rarely used in practice. If this is so, how is it that it has been deemed necessary in all the mines, with one exception, i. e., Hannan's Star, to devise a gearing on the old agitation vats to enable the mullers to be raised? In practice it has been found that owing to the high percentage of sulphate of lime in the ores there is a tendency to cake. If there is any accident the agitators are stopped, and on one occasion I witnessed the extraordinary operation of blasting an agitator vat clear of the accumulated pulps which had caked and set in the vat. Thus it is absolutely necessary to provide for the raising of the mullers in all of the agitation vats. The general experience in Kalgoorlie has been that the multi-bottomed spitz-kasten is far superior to the single large conical settling vats as used in South Africa, and I do not think that this system will be changed.

The system at the Horseshoe, recently initiated, of filling the filter-presses by plunger pumps, has resulted probably in a cheapening of the mechanical process as compared with the use of compressed air, but a correspondent informs me that the wear and tear on the pumps, in the forcing of the slimes, considerably qualifies this reduction on cost, and there is also another factor that I think would militate against the universal use of pumps for this purpose, in that the cakes formed in the presses are less homogeneous than when forced in with the steady pressure of compressed air through montejus.

Concerning the Riecken process, the great fault of the South Kalgurli plant was the fact that the large U-shaped vats employed were of too unwieldy a nature to do economical work, and the intermittent process of filling and refilling, such as was in vogue, is a drawback to all such processes; but there is a new device, now, I believe, being patented, for making the process a continuous one, and as in the Riecken process the electrical precipitation and amalgamation was greater than could be obtained by pan or plate amalgamation, I expect that the continuous process will be more successful.

E. BARTON HACK.

Denver, Colo., Jan. 20, 1903.

CYANIDING CUPRIFEROUS GOLD ORES.

To the Editor:

Sir.—I have noticed in your issue of January 17 a communication from H. Hirsching, of San Francisco, reflecting severely and unjustly on Mr. Bertram Hunt's process of treating cupriferous gold ores by cyanide.

Mr. Hirsching refers to his book on the Ammonia Process, pages 14 and 36. On the first he gives a specification of United States Patent No. 656,544. Mr. Hirsching errs, I do not care to say willfully, in stating in his rambling, vague description of a process of treating ores for copper by ammoniacal solution, that he anticipates Mr. Bertram Hunt's effective method of extracting gold from ores containing copper by means of employing ammonia and cyanide both in the same solution.

It will be noticed on inspection of Mr. Hirsching's book that he does not discharge his tailings until the ammonia is removed; he describes as follows: "All the available copper is thus washed out, and if the ore body does not require steaming to recover the retaining ammonia, the tailings may be discharged." After some further description he says: "Ores treated according to my hereinbefore described process can then be leached with a cyanide solution to recover the precious metals, as all the metals having a disturbing action on the cyanide compounds are removed, or rendered innocuous. Also the precious metals, on account of the previous treatments, will dissolve much more rapidly and a much more concentrated cyanide solution can be employed, and according to the ordinary cyanide method, the solution obtained by such leaching is preferably treated by electrolysis for the recovery of precious metals, as the concentrated state of such a solution reduces its resistance."

On page 36 Mr. Hirsching gives a description of how he treats what he terms "refractory ores" in the laboratory. He says: "Weigh out one assay-ton of ore and treat it with a dilute solution of ammonia or with the above mentioned different salt solution first, dissolve in water, and if some metal salts remain undissolved, add then a dilute solution of ammonia, wash and leach with cyanide of potassium or amalgamate it."

It will be noticed in this, as well as in the foregoing statement that Mr. Hirsching did not in the slightest degree contemplate treating cupriferous gold ores with an ammoniacal solution containing cyanide of potassium. He first removed the copper, then steamed or washed, and finally treated it with a cyanide solution, in which he does not specify the employment of any ammonia.

The novelty of Mr. Hunt's invention consists in his recognition of two facts: first the protective influence of ammonia for cyanide when together in the same solution, and in contact with copper minerals. Or, it may be put differently, that Mr. Hunt was the first to recognize that in a solution containing ammonia and cyanide of potassium, the former has a greater affinity for the metal; secondly, Mr. Hunt has demonstrated in his bulk experiment tests that when a solution of cupric-oxide is dissolved in ammonia containing less cyanide than will combine with the copper, then a cupri-cyanide of the alkali is formed which exerts solvent action on the gold equal to that of cyanide of potassium itself. He also recognized the oxidizing effect of a solution of cupric-oxide dissolved in ammonia.

It can be readily seen, therefore, that Mr. Hunt's process, which has been duly patented, has the merit of novelty, and that it in no way interferes with the claims in Mr. Hirsching's ridiculously worded and over-comprehensive specification.

LOUIS JANIN, JR.

San Francisco, Cal., Jan. 31, 1903.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Criticism rarely succeeds in being both penetrating and polite.

Science is nothing but trained and organized common sense.

The minimum interval of rest which should be allowed a stamp, on striking the die, is one-tenth of a second. If the speed of dropping is such as to give a less interval, then breakages will occur, beginning with the arm of the cam.

The object of a cam, in a stamp-mill, is to convert uniform rotary motion into a uniform lift; the curve to be given to the face of the cam, in order to do this most efficiently, is one of the involutes of a circle, the radius of the circle being equal to the horizontal distance between the axis of the cam-shaft and that of the stamp-stem.

The practice of hardening steel dates back to the remotest antiquity. Homer, Pliny and Lucretius refer to the hardness imparted to iron taken from the forge and plunged in water. The ancient Egyptians heated meteoric iron in the forge at a temperature somewhat below the melting point until it had absorbed enough carbon from the fuel to give it the requisite hardening properties, and then fashioned their weapons and tools from the metal thus obtained.

"Rolled Gold" is a cheap substitute for solid gold, used for jewelry, and consists of brass covered on one side with a thin coating of gold of any of the recognized standards. It is made by brazing a thin plate of gold on to a thick plate of brass, and then rolling the ingot out into thin sheet, from which the articles are manufactured. The gold covering may be of any quality or thickness. Gold of 9 to 10 carat is the usual quality, but better qualities are also extensively used. In the best qualities the gold is sufficiently thick to bear engraving without cutting through into the base metal. "Rolled Gold" is mostly of German origin, but it is also manufactured to a considerable extent in Birmingham, England. Before being placed on the market, articles of the poorest quality of rolled gold are "dipped" in order to improve their appearance, but the thin coating thus obtained soon wears off.

When the brass is covered with gold on both sides it is known as "filled gold." Watch cases of filled gold are made in America, and in Birmingham, England. The advantages of "rolled" and "filled" gold over electro-gilded articles is that the coating of gold on the former is much harder and thicker.

It is beginning to be recognized that industrial warfare is no better a regulator of business than private warfare is of social intercourse, and it is this feeling that has led to the organization of labor on the one hand and to the organization of capital on the other, labor seeking to reduce its hours and increase its earnings, and capital, which is crystallized labor, striving to prevent the dissipation of that which it has so laboriously gathered. Each is wrong in its aims when it seeks exclusive domination; both will be right when they learn that they are forces which must work in harmony to carry out the ancient command to subdue and replenish the earth. Strikes and trusts are the clumsy attempts of the giants, Labor and Capital, to carve out each a world on which he shall be sole lord. Co-operation will be the form in which they will work together when they realize, as they are coming to do, that as enemies they can only harm each other while as allies they are masters of the world.

THE CANADIAN MINING INSTITUTE.

The annual meeting of the Canadian Mining Institute will be held in the clubroom of the Windsor Hotel in Montreal, on Wednesday, Thursday and Friday, March 4, 5 and 6. Some thirty papers have been received and promised for this meeting, and a large attendance is expected. Some subjects of importance are to be brought up, and there will probably be some very interesting discussions at the meeting. We hope to give the full programme at an early date.

A meeting of the British Columbia Branch of the Institute is to be held in Victoria, B. C., during the first week in April. The British Columbia Mining Association will meet in conjunction with the Branch at that time.

CAPT. WILLIAM E. PARNALL.

BY OUR SPECIAL CORRESPONDENT.

Capt. William E. Parnall, superintendent of the copper mines of the Bigelow syndicate, one of the most prominent mining men in the Lake Superior copper district, died February 4 at Calumet, Mich., of cancer of the stomach. Afflicted by an incurable malady for more than six months past, Capt. Parnall fought death unflinchingly, displaying the same unfaltering courage that was exemplified, more than 40 years ago, when he fought the prize bully of Ontonagon County, from morning until evening, winning a battle that had perhaps no equal for sheer pluck and doggedness from a man who was easily his physical superior.

Capt. Parnall, like many of the men who have aided in building up the Lake Superior copper mining industry, was a Cornishman. He was born June 3, 1839, at St. Austell, Eng. During his early boyhood he attended a private school, and at the age of 13 entered a boarding school, where he pursued his studies for two years. At the age of 15 years he commenced to earn his own living. He first secured a position in Buckler's tin mine, and worked for some time there, and at various other mines near by. For a short time he shipped as a cabin boy on a sailing vessel, but soon returned to the mines, working with the shaft-men, so that he might learn the operation of the machinery.

In the autumn of 1857 he came to the United States, hoping to better his condition. He located first in South Carolina, working for a short time on a railroad tunnel, after which he was employed for 18 months in the coal mines of Virginia and Tennessee. Next he worked as a shaft-man in a coal mine at Scranton, Pa. About this time the copper deposits of the Lake Superior region were attracting considerable attention, and Mr. Parnall, with many of his countrymen, moved to that section.

Locating at Rockland, he worked in the National Mine, now closed, for two years, being made captain in that period. On leaving the National he took a position as mining captain at the Franklin Mine at Hancock, Mich., continuing in that capacity for eighteen months. He was next engaged as superintendent of a coal mine in Rhode Island, where he remained for two and a half years. He appreciated fully the value and possibilities of the Lake Superior copper deposits, however, and returned to that region as soon as he closed his engagement in Rhode Island.

In 1873 Capt. Parnall was made mining captain of the Phoenix Mine. Previous to that time the mine had produced a large amount of copper, but was running behind, owing to mismanagement. In 1874 the mine netted $24,000, and in 1875 a net profit of $55,000 was secured, in addition to expending $20,000 on surface and underground improvements. In 1876 the net profit, after providing for operating expenses and doing considerable development and construction work, was $107,186. It was in this year that the mine paid its first and only dividend, amounting to $20,000. In 1877 Capt. Parnall resigned and the mine's prosperity ended soon after.

The National Mine was entrusted to Capt. Parnall's management in 1880, and he served there a long period of years. He then accepted the position of assistant superintendent of the Tamarack Mine and after four years in that capacity was made general manager of the mines of the Bigelow syndicate, which controlled the Tamarack, the Isle Royale, the Osceola, the Ahmeek, the North and South Kearsarge, upon the retirement of the late Capt. John Daniell.

Capt. Parnall was a self-made man, starting life with little more than strong arms, a willing heart and right purposes. He rose by dint of incessant labor and equally incessant study of methods, mines and minerals. He did not arrive at his position by accident, as is proven by the constantly decreasing cost of production at the mines under his management. Capt. Parnall did not limit his ability to one line of work, but was associated with a large number of the most important industries of the Lake Superior District. He was vice-president and a director of the National Bank of Houghton; director of the Tamarack Mining Company; director of the Osceola Consolidated Mining Company; director of the Superior Trust Company; president of the Hancock Chemical Company; vice-president of the Mineral Range Railroad; director of the Marquette, Houghton & Ontonagon Railroad; president of the Tamarack Co-operative Association; director of the Lake Superior Produce and Cold Storage Company. He was heavily interested in numerous other enterprises, including the Peninsula Electric Light and Power Company; the Michigan Portland Cement Company; the Mining Gazette Company; the Lake Superior Smelting Company, and the Houghton County Real Estate and Loan Association.

Capt. Parnall devised many improvements in mining and milling machinery, and was instrumental in bringing the steam stamp mill, now generally used at the Lake copper mines, to its present form. His latest invention was a mortar, which was described in our issue of April 5, 1902.

Capt. Parnall was one of the last of the generation of able mining captains who made the great copper mines of Lake Superior. His death leaves Capt. Harris, of the Quincy, almost the sole survivor. Capt. Parnall left four children: Samuel A. Parnall is in charge of important mining properties in Mexico; W. E. Parnall, Jr., is assistant superintendent of the Tamarack and Osceola mines; Christofer and Belle, his only daughter, are students at the University of Michigan.

THE ALBANY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The following circular has been issued from the secretary's office in New York:

The eighty-fourth meeting of the Institute (being the thirty-third annual meeting) will be held in the city of Albany, N. Y., commencing February 17, 1903.

The following programme is provisionally announced:

Tuesday morning, at 9 o'clock, February 17, headquarters will be open at the Ten Eyck Hotel. Members are asked to register promptly upon their arrival and to signify their intention of taking part in the various excursions, etc., and to secure their badges.

Tuesday evening, the opening session at the rooms of the Albany Institute and Historical Society, State Street, opposite the Capitol. After an address of welcome by the Mayor, and a brief reply by President Olcott, a minute prepared by Dr. R. W. Raymond abroad, commemorative of the late Hon. Abram S. Hewitt, will be read, seconded by remarks by Dr. A. V. V. Raymond, president of Union University. Some very beautiful lantern slides of mountain scenery in British Columbia will be shown by Mr. Howard W. Du Bois, accompanied by a brief description. The session will then adjourn, and will be followed by an informal reception. A very interesting collection of art and historic treasures will be open for inspection during the entire evening.

Wednesday morning, trip by special trolley cars to Schenectady, to inspect the plant of the General Electric Company, where 7,000 operatives are employed. Luncheon, by courtesy of the General Electric Company, at their works. In the afternoon the Schenectady Works of the American Locomotive Company will be visited, and the return trip made by trolley cars.

Thursday morning, His Excellency Governor Benjamin B. Odell will receive the members of the Institute and their guests at the State Capitol.

Thursday afternoon, at 3 p. m., a session, devoted to the subject of the Application of Electricity to Mining, will be held.

Thursday evening a subscription banquet will take place at the Ten Eyck Hotel.

Friday morning, at 9.30, session.

Friday afternoon, by invitation of the Albany Chamber of Commerce, a trip by special cars will be made to the Watervliet Arsenal and to the city filtration plant. Friday evening, session.

Saturday, by a courteous invitation of the Helderberg Cement Company, a trip will be made by special cars to the cement works at Howe's Cave, optional excursions to the Hudson River Water Power Company's plant at Spier Falls by special train, leaving 9 a. m., luncheon at the Falls, dinner at the Rockwell House, Glens Falls, returning by train about 8 p. m. Members will be the guests of the company for the day.

Further announcements will be made in the local programme.

The list of papers for this meeting is as follows:

1. Treatise on Determination of Power for Rolling Iron and Steel, by Louis Katona, Resicza, Hungary.
2. Electric Power Transmission for Mining Purposes, by F. O. Blackwell, Schenectady, N. Y.
3. Flue-Dirt in Iron Blast Furnaces and Influences Controlling It, by F. L. Grammer, Baltimore, Md.
4. Electricity in Coal Mining, by W. B. Clarke, Schenectady, N. Y.
5. The Zinc and Lead Deposits of Northern Arkansas, by George I. Adams, Washington, D. C.
6. The Cost of Pumping at the Short Mountain Colliery, of the Lykens Valley Coal Company, by R. V. Norris, Wilkes-Barre, Pa.
7. Cyanide Solutions: A Test for Precious Metal Contents, by Albert Arents, Alameda, Cal.
8. Refining Lead by Electrolysis, by Anson G. Betts, Troy, N. Y.
9. Notes on the Metallurgy of Copper in Montana, by H. O. Hofman, Boston, Mass.
10. Mineral Resources of Alaska, by Alfred H. Brooks, Washington, D. C.
11. The Accuracy of School Laboratory Work with Special Reference to Gold Milling, by R. H. Richards, Boston, Mass.
12. Present Electrical Equipment of the Anthracite Field, by H. H. Stoek and George W. Harris, Scranton, Pa.
13. Notes on Accidents Due to Combustion Within Air Compressors, by A. R. Ledoux, New York City.
14. Water Hoisting in the Pennsylvania Anthracite Region, by R. V. Norris, Wilkes-Barre, Pa.
15. Precious Stones of Brazil, by Herbert K. Scott, London, England.
16. Coal Cutting and Hauling Machinery, by R. G. Hutchins, Worthington, Ohio.
17. Compressed Air Motors for Gathering Cars in Coal Mines, by B. S. Randolph, Frostburg, Md.
18. The Nickel-Copper Ores of the Sudbury, Ontario, District, by Charles V. Dickson, New York City.
19. Clays, by Heinrich Ries, Ithaca, N. Y.
20. Hudson River Water Power Company's Plant at Spier Falls, by C. E. Parsons, Glens Falls, N. Y.

Special attention will be given at the sessions of this meeting to discussion of papers on mining apparatus and mining methods.

Plans are being rapidly perfected for the British Columbia meeting and Alaska trip, and a circular will be sent to members very shortly. Special trains for this meeting will leave the East about the middle of July, and the duration of the trip will be in the neighborhood of forty days. The arrangements so far perfected promise, not only a very interesting, but an entirely comfortable trip. The authorities of British Columbia are planning for our entertainment, and it is hoped that the party will be a large one, in which case special trains and steamers can be chartered at a low rate.

ELECTRIC HOISTS IN BOHEMIA.—A large electric hoist has lately been installed at the Richard Colliery at Brux, Bohemia. It was built jointly by the Skodawerke Gesellschaft, of Pilsen, and the Austrian Schuckert Electrical Company, of Vienna. The electric motor runs at a normal speed of 294 revolutions per minute, and develops 125 h.p. in all.

THE SAMPLING AND ESTIMATION OF ORE IN A MINE—II.

BY T. A. RICKARD.

(*Continued from page 214.*)

THE WORK OF SAMPLING.

The best sampling tool is a moil when struck by a four-pound hammer. Beware of the prospecting pick or the geologist's hammer, or even the larger type of each which the working miner uses; the former insensibly, but inevitably, seeks out the soft places and crevices in the vein, and does not therefore yield a true sample, while, as to the hammer, that does the reverse and tends to break off the projecting points, which usually represent the harder portions of the ore. As a rule, the richest parts of the vein are not in the hard quartz, but, particularly near the surface, in the decomposed lode-stuff, so that the pick gives too high an average and the hammer one which is too low. By the right use of the moil and hammer this error of extremes can be avoided. Of course, the excellence of a tool depends upon the right use of it, and it is very easy to get misleading results with the moil as with the other implements already criticised, nevertheless, experience demonstrates that the former is more likely to give an approach to a perfect sample. The ideal method of sampling is the testing of a cheese by a cheese-tester, which removes a core of uniform size. In a mine the intention is to imitate this method as nearly as a material of very variable hardness and texture will allow, an effort being made to cut out a channeling or groove of uniform breadth and depth across the full width of the ore.

Either a moil or a gad is obviously best adapted for this purpose. If the ore is too hard for a moil and a single-hand hammer, get another striker and a double-hand hammer.[1] Do not let the hardness of the ore lead you into the mistake of using dynamite, in the form of "pop shots," in order to loosen the ground. No ground that can be mined in the ordinary way, that is, by drilling holes and charging them with an explosive, is too tough for a moil struck by a double-hand hammer and swung by a good man. The use of an explosive introduces an element of danger from "salting," as it is easy to charge the cartridges with powdery gold, which the dynamite will distribute very prettily amid the ore. Of course, one can avoid such tricks by using one's own dynamite, but engineers, as a rule, do not find it convenient to travel about with high-grade explosives. Apart from this, there is a commoner danger. Dynamite tends to break a conical cavity, with the drill-hole as the axis of a cone which tapers inward. The product of the drill-hole would not be a fair sample even if it could all be secured without loss or interference. Usually the explosion of the hole breaks a mass of rock, the cross-section of which tapers from the width of several feet to almost a point, so that as a sample the material obtained is misleading. To pick a sample out of a mass of ore thus broken, or to take it all, is a procedure likely to lead to serious errors.

An accurate sample represents a true cross-section of the ore, it depends, therefore, upon the uniformity of size of the groove or furrow, that is to say, an equal amount of ore must be broken across every part of the entire width of the lode. That is what makes sampling difficult, especially in gold-veins, the predominant matrix of which is quartz, in some form, varied by softer, more friable minerals, which cause marked contrasts in the ease of fracture. In one case, which came under my notice, it took six men (three of whom moiled while the other three held the boxes to receive the samples) the whole of one shift to take three samples across a vein 12 ft. in cross-section, and in accomplishing this they dulled 35 moils. *That* was good, honest sampling.

[1] A single-hand hammer, that is one requiring the use of only one hand, ordinarily weighs 4 lbs. A double-hand hammer weighs from 8 to 10 lbs.

THE SIZE OF THE SAMPLE.

This question is an important one. It is a matter to be decided by convenience, scientific principles and experience. We will consider the least important first. Large samples are more difficult to handle than small ones and require more assistance. In mountainous regions or in desert places, where facilities for crushing the ore are lacking, it will be found inconvenient to break samples so big that their reduction by hand consumes much time. Occasionally greater inconvenience than this will arise through the want of facilities for removing the ore from the mine without entrusting it to unsafe hands. The factor of time has been mentioned, that of cost must not be forgotten, for time and money are valuable alike to the engineer and to his client, so that the former will find it advisable "to cut the coat according to the cloth." Every engineer runs up against obstacles such as have been referred to, and these vary so much with each individual case that it is needless to attempt to specify them in greater detail.

The size of the sample will also depend upon the facility with which the ore can be broken, because the scientific principle underlying the act of sampling is the obtaining of a true cross-section of the lode. In the case of an ore having the consistency of cheese, which is by no means an impossible occurrence and is approached by certain lodes which are built up of crushed material, a perfect sample can be obtained by running a "scraper" over it so as to make a narrow furrow across the full width of it. This will result in a sample of minimum size. On the other hand, in order to obtain a true sample of a large lode made up of streaks of varying hardness and uneven fracture it will be found necessary to break a hundred pounds at the very least. In such a case it is impracticable to secure a sample of the hardest portions except in large irregular pieces, and this necessitates the breaking of a proportionate amount of material from the places where the ore is much softer or of easier fracture. In hard quartz-veins it will be found that a channeling from 4 to 6 ins. in width, and from ½ to 1 in. deep, will be adapted to the securing of a true sample; in those instances where the ore has a fairly even grain, as with replacement deposits in igneous rocks of granular texture, it will be found that a groove 3 ins. wide, and from ¼ to ¾ in. deep, will give a true sample. The minimum size of groove which will yield a correct result should be chosen because any unnecessarily large groove simply increases all the work of subsequent reduction and handling of the samples without a commensurate increase of accuracy in the final results. Furthermore, one has always to remember that two samples of 50 lbs. each at 5 ft. apart are better than one sample of 100 lbs. at an interval of 10 ft. The whole idea underlying the operation is that of securing an average, and it is obvious that the larger the number of data the more likely one is to approximate the truth.

The next factor is more important than the two already considered, I refer to that invaluable guide, Experience, without whom all work of this kind is as dangerous as is mountaineering in the Alps to a thoughtless tenderfoot. To one who has done his own sampling and assaying there has often arisen the inevitable contrast between the dimensions of the sample and those of the gold button which represents its contents. Whatever the size of the original sample the outcome is merely one button of minute size. Gold, as at present known to exist in workable lodes, occurs in a metallic form which is usually disseminated through the ore in an extremely irregular and sporadic manner. As a consequence the final pulp taken for assay, and weighing, as a rule, about an ounce, if not less, is apt to contain a coarse speck of gold, the accidental presence of which vitiates the result. Whatever the weight of the original sample, whether 5 lbs. or 500 lbs., the particular particle of gold included within the final pulp will have the same effect of exaggeration, save in one respect, viz., that, given the fact of its occurrence in the original sample, it is more likely to find its way into the assay pulp of a small sample, the latter being to the former in the proportion of 1 oz. to 5 lbs., or, say, 1 to 80, than in a large sample the final pulp of which represents, say, one part in 8,000 parts of the original. When, however, the gold is not present in the usual condition, but occurs in that pulverulent state known as "mustard gold," characteristic of the metal when it is the product of decomposed tellurides, then the more even dissemination of the gold causes it to be so spread throughout the sample as to make the size of the latter a factor of safety. Of course, usually, the particles of gold become flattened out during the process of crushing previous to the assay, so as to appear on the screen in the form of scales, termed "metallics," and the practice is to pick them up, weigh them, cupel them, and then determine their weight in relation to the weight of the sample, but this does not overcome the interference with accuracy because, although this determines the proportion in which such particles occurred in the particular sample, it does not give any clue as to the relative importance of such particles in the enrichment of the entire lode. Naturally, in small samples the interference is relatively greater and therefore more clearly recognizable. On the whole, therefore, one comes back to the conclusion that the best rule to follow is the taking of the smallest sample consistent with securing a true average of the lode at each cross-section. The larger the sample the more difficulty in handling it, the more persons required to help and the greater the chances of poor work. Let me mention an example. Two engineers examine a mine and, in carrying out their investigations, one gets large samples resulting from a wide groove, while the other takes small samples, the product of a smaller groove. Although both samples are equally good, in so far as they represent an approach to the true cross-section of the lode at each place sampled, nevertheless, the former, on account of the greater size of the samples is, theoretically, the better of the two. However, the second engineer employed fewer assistants, and all those whom he employed in this capacity were men whose antecedents he knew and whose reliability he had previously tested, while the first engineer engaged his gang of samplers at the mine, most of them being vouched for by the management or by a fellow-engineer, yet the element of error was increased by the number of men employed, the real ability of each to take true samples being merely assumed on the statement of some one else.

THE REDUCTION OF THE SAMPLES.

When the samples are broken they are put into sacks which are not marked upon the outside, but are, preferably, labeled by inserting a tag with the number upon it. This tag is often merely a piece of paper, detached from a notebook, but in this form it is apt to get torn or the number upon it obscured, especially when the ore is moist, therefore it is best to use a metal or wooden tag especially prepared for this purpose. The latter will be found convenient. Get a lot of small pieces of soft wood (⅛ in. thick, 1 in. wide and 1½ ins. long), and mark the numbers of the samples upon them by the use of a hard pencil; this will remain as a visible indentation even after the pencil trace has been rubbed off.

The samples are then removed to a safe place either temporarily in the mine itself or to a building where they can be locked up. Then comes the work of reducing them in bulk by crushing and subdivision. If an assay office is conveniently at the engineer's disposal he will probably find a rock-breaker which he can use, otherwise a portable rock-breaker, worked by hand, will be found a useful machine to take with him when a large sampling job is to be done. In the absence of these conveniences the ore is broken by hand with a cobbing hammer, to the size of walnuts, and then subdivided. This is followed by further reduction in size and subsequent subdivision by quartering.

It is usual to place the crushed ore upon a square sheet of canvas, which is rolled backward and forward in opposite directions in such a manner as to mix the ore lying upon it, until finally a conical pile is left standing in the center. This is flattened to a frustum previous to quartering, the two opposite quarters being taken and again mixed previous to a further mixing and quartering, until the bulk of the sample has been reduced to the size considered suitable for shipment to the assay office.

The foregoing method is open to criticism. In the first place, the rolling canvas is not nearly so good a way of mixing as it looks, the fines are apt to slide over the surface of the canvas instead of becoming thoroughly mingled with the coarser particles; moreover, the cone which is finally formed is deceptive in that the fines are likely to be collected not at the center of the base of the cone, as is supposed, but to one side so that, in quartering, any particular division may include an undue proportion of the fines, which usually form the richest part of the sample. Further, in flattening the cone into a frustum, for convenience in quartering, it is difficult to distribute the ore evenly, and though great care be taken to draw the ore in a straight line outward, toward the circumference, the distribution is liable to be faulty and this part of the work may be so imperfectly done as to become a source of error.

An alternative, and better, method can be suggested. Get a few short boards, or cause some to be sawed to the required length, of about 6 ft., and put them together so that they will make a platform which can be kept firmly in place by being spread upon a couple of sills and wedged in with stones. Then, if the joints are not tight, put your sheet of canvas upon it, not to roll the samples within it, but merely to prevent any leakage of fines through the cracks between the boards. When the sample is crushed, gather it up, with a scoop or other handy implement, to the center, lifting the broken ore, shovelful by shovelful, and pouring it as nearly as possible at the same central point so as to aid the mixing of it. In doing this it will be found convenient to use the "cone," in vogue at many smelters, which consists of a sharp central cone, made of iron, with four thin radiating partitions which cause the ore, as it falls upon the center, to become quartered.

In order to do accurate work at this stage it is necessary that the particles of ore should not vary too much in size. The fines are apt to obscure the fact that there are a good many large lumps, and the unaided eye is likely to mislead in this respect. For this reason it is well, if convenient, to use a wire screen, say, ½ or ¾-in. mesh, or perhaps two, one of ¾ and the other of ¼-in. mesh, to be employed at successive stages of the operation, so that the maximum size of the particles can be kept within defined limits. It is an easy matter to take a piece of wire cloth, say, 1 ft. square, and have a frame put around it when you reach the mine.

If it is necessary to send the samples to a distant assay office or to take them with you on your departure from the mine, then it becomes convenient to reduce them until they weigh only three or four ounces each. In doing this the engineer will anticipate the work of further reduction which is usually carried out by the assayer. The samples will be crushed smaller and passed through, say, a 10-mesh screen, and ,instead of quartering, it will be well at this stage to use a gridiron sampling device, which consists of a series of metallic scoops separated by vacant spaces of equal width so that one-half of the ore falls through while the remainder is arrested. When this method has reduced the bulk of the samples to the desired dimensions they are put into small paper or canvas sacks, the latter preferably, especially if it is intended to ship them a long distance.

If genius be, as has been authoritatively stated, "an infinite capacity for taking pains," then it is safe to say that genius is exactly the mental quality needed for the humdrum work of sampling, for, to do it conscientiously and well requires patience, strength and an amount of unwearied watchfulness sufficient to elevate this common task to the level of a fine achievement. It requires an obstinate persistence to get a true average across a hard and tough quartz-vein; any relaxation of care or muscle will at once result in the spoiling of the sample and the consequent introduction of an error into the calculations of the engineer. It needs judgment to know how to treat a cavity (or vugh) or an unusual inclusion of waste rock, it needs a nice sense of proportion to avoid cross-sections which are exceptional, to break an equal weight of ore along a line 10 or 12 ft. in length, and to get the true width of an irregular cutting. For these reasons it is best, when carrying out an arduous scheme of sampling, to divide the muscular from the mental work, allowing a miner to do the actual breaking under the direction of an intelligent trained assistant who holds the receptacle for the ore as it falls, and at the same time watches the movements of the miner. Further, it is well to make the hours of labor short so as to avoid an excessive strain on the faculties, such as will cause relaxation of the intent watchfulness and care necessary to good sampling. In order to escape the risk of inferior work it is good practice to vary it, as, for instance, by putting the assistants to surveying or mapping for a day or so, at intervals. Otherwise your men are apt to get "stale" through weariness. How tiresome such work is those can testify who have done much of it; the dirt, the wet, the strained positions, the splinters that hit the face and hands, the obstinacy of rock and circumstance, the weary iteration of it; these require something better than mere mule-like persistence to overcome them, and the man who can do a difficult piece of sampling honestly and well can be entrusted to do work for which much greater credit is usually given by those in authority.

(To be Continued.)

CUT IN MANGANESE ORE, PONUPO.

YSABELITA MILL, CUBA.

MANGANESE MINING IN CUBA.

By A. E. Highway.

Ponupo Mine.—This is the most important in Cuba, and it is likely to maintain this position. The output for last year was 33,000 tons, averaging 49 per cent manganese. The property is more extensively developed than any other manganese property in Cuba, and has several reserve deposits as yet only exploited enough to demonstrate the presence of manganese in quantity. One of these is now about to be developed.

The Ponupo Mine proper is a dome-shaped hill about 80 acres in extent, situated about 650 ft. above sea level and 125 ft. above a small stream to the north and east; on the south a branch railroad extends into the surface workings. The ore is found well distributed over the entire hill; it is mingled, more or less, with *byates,* which are mixtures of jasper and manganese oxide. In some places the *byate* exists in immense masses weighing several hundred tons. The manganese oxide may be either massive or penetrate into the *byate.* Beds, blankets or pockets of manganese oxide occur, for the most part, parallel to the surface of the hill; more than one layer may occur and the over-burden varies from practically nothing to 10 or 15 ft.

The original work has been irregular and without system so as to confuse and hinder future exploitation. The ore varies from nearly pure manganese oxide to mixtures of rock and dirt. At this time it is deemed advisable to work only such material as can be separated by a log washer, of which there are three at this mine. The tailings carry from 15 to 30 per cent manganese and are impounded, as the laws do not permit of their being turned into the stream.

Constant prospecting for new ore is going on and upon the 700 acres owned by the company several new deposits have been discovered. The number of men employed varies from 150 to 225; wages are 85 cents per day. The usual output of these mines is 2,000 tons of ore per month; the prospective yield for next year is the same as for 1902.

These mines are situated 22 miles from Santiago. The freight rate is $39 per car of 30 tons. The royalty 7 per cent. Transport to New York is $1.80 to $2 per ton. Cost of mining $2.25. A cargo of from 2,000 to 4,000 tons is kept on hand at the mine. Upon arrival of a vessel it is delivered to the ship at the rate of 400 tons per day.

The Boston and Ysabelita mines are now being worked. The former has on hand about 2,000 tons of ore, which has been separated by a double process log washer, in combination with compound jigs. This mine has its own railroad from the main line at Cristo, about 3 miles distant.

While the Ysabelita is on this line of railroad it does not seem to have made satisfactory arrangements for transport. This company also has an aerial tram from the mine to the mill, a distance of 3,000 ft. Operations have just begun, and it remains to be seen if the jig process in the mill is to be a success.

SCOTCH PIG IRON PRODUCTION.—The following is the statement of production and consumption of Scotch pig iron for the year:

	1901.	1902.	Changes.
Stocks, Jan. 1	134,646	135,257	I. 611
Production	1,113,990	1,295,074	I. 181,084
Total supply	1,248,636	1,430,331	I. 181,695
Consumption	835,932	956,219	I. 120,287
Exports	277,447	386,758	I. 109,311
Totals	1,113,379	1,342,977	I. 229,598
Stocks, Dec. 31	135,257	87,354	D. 47,903

The increase in exports was due chiefly to buying for the United States.

QUINCY GRANITE SHIPMENTS.—According to *Granite* the rail shipments in 1902 from South Quincy, Mass., were approximately 50,522,981 pounds; West Quincy, 52,640,315 pounds;

Quarry railroad, 29,983,135 pounds; total, 133,166,413 pounds, against 221,377,257 in 1901. The falling off of 88,210,826 pounds, or 39.8 per cent in 1902 is chiefly in Quarry Railroad and West Quincy shipments. Though the rail shipments in 1902 show a heavy decrease, it must be considered that thousands of tons were sent direct from the quarries for building purposes. Prospects for 1903 are good.

THE GENETIC CLASSIFICATION OF ORE-BODIES.—A PROPOSAL AND A DISCUSSION.

SPECIALLY REPORTED FOR THE ENGINEERING AND MINING JOURNAL.

At a recent meeting of the Geological Society of America (January 14, 1903) a tentative genetic classification of ore-bodies was proposed by Mr. W. H. Weed, and it became at once the text of an animated discussion. Among our readers none are more keenly interested in the origin of ores than those who are practically engaged in mining, therefore it gives us especial pleasure to present an account of the proposed classification and an outline of the discussion which it incited.

The subject was introduced by Mr. S. F. Emmons, who recalled the conditions confronting Clarence King when, in 1879, it fell to him to shape the policy that should direct the economic work of the Geological Survey. At that time but little progress had been made toward a clear understanding of the general principles of ore-genesis. King believed that systematic study of the important mining districts of this country would discover such general principles, and result in material contributions to the then somewhat neglected study of ore-deposition. Investigations carried out by the Survey during the past twenty years had, Mr. Emmons considered, justified King's belief in the policy then initiated. The careful studies of many mining districts in this country had not only added directly to our knowledge of ore-deposits, but had supplied a mass of selectively recorded observations that had made possible the recognition of such general principles as those enunciated by both Mr. Weed and himself in regard to secondary sulphide enrichment, by Mr. Lindgren with reference to metasomatic processes and contact metamorphism, and by Prof. Van Hise in connection with the circulation and action of meteoric waters. While a great deal remained to be done before the processes connected with ore-deposition were fully understood, there had undoubtedly been a great advance in this direction during recent years, and we were perhaps now in a position to discuss a preliminary classification of ore-bodies on the basis of genesis.

Mr. Emmons desired to define his own position, since his views expressed in the first report on Leadville had been misunderstood. In that report, being yet new to the study, he had declined to discuss the *ultimate* source of the metallic minerals, but as regards the *immediate* source—that is, how they at last reached their present position, he had said the waters which deposited them were descending from the porphyry contact into the body of the underlying limestone and did not come up through fissures in the Archean, as was then maintained by some mining engineers, who based their statements not on observation but on theory. He also stated his belief that they had been leached from the neighboring porphyry bodies. His statements with regard to these particular deposits had been construed to class him among the school of descensionists, and this construction still seemed to hold among some writers. In point of fact, as shown in his later writings, while recognizing that most deposits were formed directly by ascending waters, he differed from the ascensionists, especially as voiced by Posepny, in believing that as regards their *ultimate* source the metallic minerals were brought from great depths to the vicinity of the surface or within reach of meteoric waters rather in the magma of igneous rock than in aqueous solution. Hence, in 1893, he had welcomed Vogt's recent demonstration, that certain iron ore deposits had been formed by a magmatic differentiation during the cooling of igneous rocks, as a line of investigation that would prove fruitful in determining the probable ultimate origin of the material of our deposits, but he still believed, as he stated then, that most of our deposits in their present form were the result of a later concentration by circulating waters of meteoric origin. A pneumatolytic origin, for a certain class of deposits, especially near the contact of igneous rock in limestone, could be demonstrated by their mineral association, and it was very possible that some of the metallic contents of other deposits, where this mineral association was wanting, might have originally been separated from an igneous magma by pneumatolysis. If, however, in the present condition of the deposit the agency of circulating waters was the only one that could be actually demonstrated, and was the final cause, it seemed to him that this origin should be the one to be recognized in the classification.

Mr. Weed, in his prefatory remarks, emphasized the divergent views of those who maintained that most ore deposits were the work of underground meteoric waters which had derived their mineral contents from the rocks traversed, and those who held that the greater number of workable ore-bodies resulted from the gases and vapors given off from fused magma in the process of cooling. In the former group which he designated as *descensionists* he placed Van Hise Emmons and Rickard in the latter, or *igneous group*, Beck, Vogt, Kemp, Lindgren and himself. He firmly believed that igneous intrusions had furnished not only the heat for most hot waters but also the mineral contents, either directly as differentiations or emanations, or through the leaching of the rocks by vapors and heated waters.

Mr. Weed remarked that probably every one who had written or lectured upon ore deposits has felt the need of a systematic arrangement of his data, and has adopted some sort of classification. Such grouping was important because it facilitated discussion of the differences between ore-deposits, and lent itself to the orderly presentation of facts and descriptions. The provisional classification which he submitted was an attempt of this kind. He owed much to the work of others, particularly of Lindgren, Beck and Kemp, but he had aimed to give precedence to genetic distinctions followed by those based on structure and on mineralogy.

Genetic Classification of Ore Deposits.

BY W. H. WEED.

I. Igneous (Magmatic segregations).
  A. Siliceous.
    a Masses—Aplitic masses, Ehrenburg, Shartash.
    b Dikes—Beresite or aplite, Berezovsk.
    c Quartz Veins, Alaska, Randsburg, Black Hills.
  B. Basic.
    a Peripheral masses.
      Copper.
      Iron.
      Nickel.
    b Dikes. Titaniferous iron—Adirondacks, Wyoming.

II. Pneumatolytic Deposits (deposited by igneous emanations: the gases above the *critical point*, e. g., 365°C for H_2O).
  A. Contact Metamorphic Deposits.
    Characterized by gangue consisting essentially of garnet, epidote, actinolite, calcite, and other lime-alumina silicates.
    a Deposits confined to contact:
      1 Magnetite deposits.
      2 Chalcopyrite deposits, Kristiania type.
      3 Gold ores, Bannock type.
    b Deposits impregnating and replacing beds of contact zone:
      1 Chalcopyrite deposits—(a) Pyrrhotite ores, (b) magnetite ores, Cananea type.
      2 Gold tellurium ores, Elkhorn type.
      3 Arsenopyrite ores, Similkameen type.
  B. Veins (closely allied to Magmatic Veins and to division IV.)
    a Cassiterite—Cornwall.
    b Tourmaline Copper—Sonora.
    c Tourmaline Gold—Helena.
    d Augite Copper, etc.—Tuscany.

III. Fumarolic Deposits. Metallic oxides, etc., in clefts in lavas. No commercial importance.
    Copper.
    Iron, etc.

IV. Gas—Aqueous (Pneumato-hydato-genetic) Deposits. Igneous emanations mingled with ground-waters.
  A. Filling Deposits.
    a Fissure veins.
    b Impregnation of porous rocks.
    c Cementation deposits of breccias.
  B. Replacement Deposits.
    a Propylitic—Comstock.
    b Sericitic Kaolinic.
      Calcitic.
      Copper silver.
      Silver lead. Clausthal.
    c Silicic dolomitic—Silver lead—Aspen.
    d Silicic calcitic, Cinnabar.
    e Sideritic silver lead—Coeur d'Alene, Slocan, Weed River.
    f Biotitic Gold Copper—Rossland.
    g Fluoric Gold tellurium—Cripple Creek.
    h **Zoolitic—Lake Superior.**
    Structural types of above:
      a Fissure veins.
      b Volcanic stocks—Nagyag; Cripple Creek.
      c Contact chimneys—Judith.
      d Dike replacements and impregnations.
      e Bedding or contact planes—Leadville; Mercur.
      f Axes of folds.
        Synclinal basins.
        Anticlinal saddles—Bendigo; Elkhorn.

V. Meteoric Waters.
  A. Underground.
    a Veins.
    b Replacements.
      Iron ores—Michigan.
      Copper ores—Michigan.
      Lead—Mississippi Valley.
      Zinc—Mississippi Valley.
    c Residual.
      Gossan iron ores.
      Manganese deposits.
  B. Surficial.
    a Chemical.
      Bog iron ores.
      Copper ores.
      Sinters—Anaconda.
    b Mechanical.
      Gold Placers.
      Tin Placers.

In explanation of the foregoing scheme of classification Mr. Weed said that the six primary subdivisions, as given by him, might be reduced to two: First, those of direct or indirect igneous origin, and, second, those due to aqueous agencies. As, however, there were intermediate types he had deemed it best to make the subdivisions given. These six primary subdivisions had been arranged to run from the magmatic segregation of original igneous rocks to the deposits directly or indirectly due to the emanations from igneous rocks, up to those due entirely to aqueous agencies.

The first class embraced only deposits which were now generally admitted to be due to the differentiation of igneous rocks. These types of ore-deposits were but little known in this country and had been best studied by the Norwegian geologist, Vogt. Under the general term of magmatic segregations, he had distinguished masses from dikes. The first term embraced the irregular contact deposits of iron ores, copper ores and nickel ores, commonly associated with basic rocks, and due to extreme differentiation of these rocks. Besides masses he had added the dikes which represent extreme differentiation products of the magmas, the basic differentiations being titaniferous iron ores, examples being those of the Adirondacks and of Ontario, described by Prof. Kent and by Prof. Adams, while recently Mr. Lindgren had described an example in Wyoming. Quartz veins, while not so generally admitted to be an extreme acid product of the differentiation of igneous rocks, were, he considered, now admitted by many geologists to grade into pegmatites and those aplitic rocks grouped under the name of Alaskites, concerning the derivation of which there was no dispute.

The second subdivision was the one which he thought somewhat different from anything heretofore proposed, and it was limited to deposits produced by the gases given off by highly heated igneous magmas. Mr. Weed explained that the term "pneumatolytic" which was used as synonomous with the term "gas" in the paper, under discussion, implied the action of heated gases and vapors upon solids. The evidence that ore-deposits were formed under such conditions and not by ordinary waters or by steam and other gases at lower temperature, was afforded by the mineral composition of the ores, and especially when examined in thin section under the microscope. It had been found that such ores were associated with garnet, quartz, wollastonite, vesuvianite and other typical contact metamorphic

minerals. This association was such that there was no doubt that the ore minerals in some cases were contemporaneous with the minerals above mentioned. It had been shown by Joseph Barrell that in certain cases the metamorphism of the sediments is complete, and their recrystallization into contact metamorphic minerals had been effected before the consolidation of the igneous magma whose heat and vapors had caused the metamorphism. In such cases the still fluid magma was giving off aqueous vapor above the critical point, which, according to physicists, was highly charged with fluorine and other mineralizing agents. This had been discussed by Vogt, so that detailed discussion would be out of place then. The subdivisions under this contact metamorphic type were based upon the occurrence of the ore along the contact of the igneous rock or in beds upturned and extending some distance from the contact, though generally underlaid by the igneous rock. The recognition of the latter type of deposit had been made by Vogt and Beck, but no separate place had been assigned to them. Inasmuch, however, as it has been found that the structural difference was one of importance, he had separated them and used the term "bed replacements" as equivalent to the "strike deposit" of Beck. The individual types given under each heading were based upon mineralogical distinctions, which were the result of chemical differences in the mineralizing vapors and accorded, therefore, with ores of different character.

The second class in the group of gas deposits were veins in which the fissure had simply been the channel for the vapors, and in which the impregnation of the country rock on each side of the fissure was essentially characteristic. Pegmatite veins had been recognized as of this general character, and the close relationship between pegmatites and the cassiterite veins of Cornwall was quite well known. To this he (Mr. Weed) would add the veins characterized by tourmaline and copper, and those characterized by gold, pyrite and tourmaline. The latter was, so far as he knew, new in the literature of ore-deposits, and he had but one example to present in which the similarity to the copper tourmaline deposit was very marked, the gold occurring solely in bunches of tourmaline disseminated through aplite, the example being near Helena, Montana, at the Winscott Mine. Near Tyson's Wells, Arizona, there was a very large amount of gold ore of similar occurrence, but without the tourmaline, the gold occurring in pyrite, and he expressed doubt as to whether it belonged to this class or should be referred to magmatic segregations.

The third group of fumarolic deposits was of no commercial importance. It embraced deposits of ferric chloride, cuprous oxide and other metalliferous minerals formed in clefts about volcanic craters. Deposits of this kind had been observed by Geikie, Fouqué and other geologists, who had also analyzed the gases given off from these cavities and had made analyses of the deposits. They were assigned to a separate class because they occurred at the surface of the earth, and the veins were extremely fumarolic and not pneumatolytic, as the term was used by the speaker.

The fourth group embraced by far the largest in number of the commercially valuable ore-deposits of the world. Ore-deposits of this character were those which had been commonly assumed to be due to aqueous agencies, and it was well perhaps to emphasize the distinction to be made between the origin of these ore-deposits as understood by him, and the origin ascribed to them by Prof. Van Hise. According to Van Hise, ore-deposits due to aqueous agencies were formed from material gathered by circulating waters extracting the metal contents of the rocks traversed by them and depositing this material after the waters have been concentrated in trunk channels. While the speaker agreed, in the main, with the brilliant work of Prof. Van Hise in explanation of the movements and course of underground waters, he believed that the source of the metals was in most cases to be found in the vapors given off by the cooling igneous rocks, and in a minor degree to leaching of the rigid differentiated portions of cold igneous rocks by circulating waters. The difference was an essential one, since he (Mr. Weed) believed that the waters were to be regarded as the vehicle, and not the agent, and that it was the mixture of the pneumatolytic gases with meteoric waters that formed the metal-bearing solution.

Under the head of gas and water deposits, meaning by this title admixed igneous gases and meteoric waters, he had placed two classes. The first were filling deposits, in which open fissures were filled by mineral crusts; secondly, replacement deposits, in which the primary fissure was a minor, though very important, structural feature serving simply as the channel by which the solutions obtained access to the congenial rocks which they replaced. The term "congenial" was used to imply a rock which was rapidly replaced by the particular waters acting upon them. At this point a distinction might be very properly made upon the basis of the chemical composition of the waters, and he had therefore indicated the subdivisions given by Mr. Lindgren, with which, in the main, he agreed. Inasmuch, however, as the structural conditions which he had indicated in his table were not only of genetic, but of great practical importance, he had inserted them. They were the determining factors in the localization of the deposits, and if the chemical basis was adopted it would be necessary to recognize the distinctions *a* to *g* under precisely each one of the chemical subdivisions given.

Under the fifth group, that of meteoric waters, he would place those deposits in which meteoric waters had taken the metals in solution and carried them to the place where they had been deposited as ores. This was his (Mr. Weed's) conception of the ore-deposits formed according to Prof. Van Hise's theory, of which the Mississippi Valley lead and zinc deposits seemed to be typical examples, and practically the only examples known to the speaker. This was not because he denied the great importance of meteoric waters, nor the fact that such waters when heated by igneous rocks might produce the hot springs now forming ore-deposits, but where the hot spring waters owed their heat to igneous rocks he preferred to assume that they had obtained their metaliferous contents from the gases given off by such rocks, but if these two groups were adopted it would be necessary to remember that transitions from one to the other could occur, and that when the igneous rocks had solidified but were still heated, that the motive power was furnished by them, and that the leaching of such rocks by the heated waters might furnish the metalliferous contents.

The sixth group embraced sedimentary deposits whose character was so well known that it was hardly necessary to elaborate them. It was, however, wise to distinguish between those which were chemical precipitates and those which were of mechanical origin, the first being exemplified in the bog iron deposits and the second in gold placers.

Mr. J. E. Spurr, following Mr. Weed, said that he, too, had been for some years working upon a scheme of genetic classification which in its present form is shown on the tabulated statement submitted.

Mr. Spurr remarked further, that the class of siliceous magmatic segregations was proposed first by him in a report on "The Geology of the Yukon Gold Belt," the field work of which was done in 1896, and the report written in the winter of 1896-7, while it was not finally issued until March 4, 1898. In this report he argued that the origin of the gold-quartz veins of the Yukon District, and probably of other portions of the world, was in part, at least, by direct siliceous magmatic segregation. In 1900, in an article on "Quartz Muscovite Rock from Belmont, Nevada, the equivalent of the Russian beresite," he argued that the mineral-bearing quartz veins of the district, as well as certain peculiar changes in the igneous rock and the adjoining rock, were brought about by solutions residual from the final phase of magmatic differentiation.

Under the term solfataric deposits, Mr. Spurr intended to classify ore-deposits formed chiefly by waters or waters and gases expelled from consolidating igneous rock. but deposited at a distance from this rock.

The term *stygian deposits* was offered as a general appellation for ore-deposits formed underground by waters of atmospheric origin.

The term *interstitial deposits* was adopted for the filling of pores in rocks, in place of the term impregnation deposits, which had no well-defined meaning, and partly of the term disseminated deposits.

The term *filling deposits* was proposed as a general name for deposits filling pre-existing cavities,

GENETIC CLASSIFICATION OF ORE DEPOSITS.

By J. E. Spurr.

Order.	Manner of Formation.	Place.	Class.	Type.	Sub-Type.
Original (Formed during the Cooling Processes of Igneous Rocks).	Chemical (Deposited from solution).	Underground.	Basic Magmatic Segregations.		
			Siliceous Magmatic Segregations.	Gold-Quartz veins of magmatic extraction. Ore-Bearing Pegmatites.	
			Contact Metamorphic Deposits.		
			Deep-seated Gaseous Deposits.	Tin Veins, etc.	
			Fumarolic Deposits.		
			Solfataric Deposits.	Replacement Deposits. Interstitial Deposits.	Fissure Veins (Spaces of Discission). Cave-Deposits (Spaces of Dissolution).
Subsequent Formed from cold rocks (sedimentary or igneous by atmospheric waters).	Chemical.	Underground.	Stygian Deposits.	Filling Deposits.	
		Surface.	Bog Deposits, etc.		
	Mechanical (Deposited from suspension).	Surface.	Placers.		
	Residual (Left by subtracting effect of mechanical and chemical actions).	Surface.	Residual Deposits.		
Transitional.	Chemical.	Underground.	Regional Metamorphic Deposits.		

replacing the term crustified deposits proposed by Posepny.

The term *subsequent deposits* was proposed for ores which were not directly the result of igneous processes.

Regional metamorphic deposits were put in a separate division by themselves, as being distinct both from original and subsequent deposits.

It was interesting to note, Mr. Spurr added, that the least important subdivisions in this classification, between ore-deposits occupying spaces caused by rending and those caused by solution, were the primary divisions of ore-deposits as proposed by Posepny. The next least important divisions in the classification, namely, replacement, interestitial, and filling deposits, had also been regarded by many as the most important.

Under contact metamorphic deposits, Mr. Spurr understood ore-deposits brought about by the same agents which produced contact metamorphism in general. These agents were usually held to be both waters and vapors derived from the cooling igneous rock. He, therefore, believed that ore-deposits might be formed in different ways during the processes of contact metamorphism, and he did not limit this class of deposits to ores deposited by gases alone. In 1895 he described the Silver ledge at Mercur as probably being due to the effect of circulating waters, during contact metamorphism, and he believed an important class of deposits to be thus formed. The ores of the Southern Klondike district, in Alaska, had, he believed, this origin.

Mr. Waldemar Lindgren acquiesced in the general plan of Mr. Weed's scheme. He said that he believed that ore-deposits formed through the agency of water above the critical temperature, associated with other gaseous emanations, constituted a distinct and characteristic class, as expressly stated in his recent paper on contact metamorphic deposits. As regards the magmatic segregations (Mr. Weed's first division) he had some doubts. While workable deposits of base metals might be so formed, evidence was wanting to show that ores of silver or gold, sufficiently valuable to be worked, were ever formed in this way.

Mr. Lindgren expressed himself as in full accord with the fourth division of Mr. Weed's classification. The idea that emanations from magmas, mingled with meteoric waters, were effective agencies in ore-deposition had been emphasized in his paper on "Metasomatic Processes in Fissure Veins." Deposits due to the underground circulation of originally atmospheric water were very numerous, but in his opinion they contained chiefly common metals, such as iron or copper.

The speaker then expressed some doubt whether the time had really come for a genetic classification, as it was only necessary to mention the names of Van Hise and Vogt to realize how widely divergent were the views of prominent investigators.

He then discussed the physical properties of gases and liquids with reference to their critical temperatures. He illustrated the action of mineralizing agents (i. e., substances that facilitate the formation of certain minerals without themselves necessarily entering into the composition of the new mineral) by certain synthetic experiments of Doelter's, in which metallic sulphides were formed in the wet way only when a little sodium carbonate was added to the solution. The most active mineralizing agents in nature were water, at a high temperature, and certain volatile combinations of silicon, fluorine, chlorine, boron, zirconium and tungsten.

The presence of one or more of these mineralizers seemed to be a necessary condition for the formation of the characteristic contact-metamorphic minerals, such as garnet, epidote, vesuvianite and andalusite. These minerals had not been artificially formed by simple dry fusion, nor on the other hand did they appear to be formed in nature by the action of fluid water. Mr. Lindgren concluded that they, and the ores intimately associated with them in contact deposits, had been produced in the presence of gaseous mineralizers, such as water above the critical temperature and other emanations from molten magmas.

For the foregoing process the word *pneumatolysis* had been used. This word had been variously employed, however, by different writers, often in a sense synonomous with fumarolic or solfataric. It appeared therefore that some new term should be adopted to express the action of gaseous emanations from intruded magmas given off above the critical temperature of water.

According to Mr. Lindgren, if we assumed a temperature gradient of 1° C. for every 30 meters in depth, water would certainly be above the critical temperature (365° C.) at a general depth of 11,000 meters. If an intrusion of igneous material took place, say, 2,000 meters below the surface, where even hydrostatic conditions would give the necessary pressure of 200 atmospheres, the temperature at the contact would certainly be at least 1200° C., and for a long time it would exceed 370° for a long distance from the contact; that was to say, in this zone water could exist only as a gas.

The mere diffusion of heat from a molten body through an adjoining compact body was very slow, and did not extend a very great distance beyond the contact. But conditions changed when we considered that the intrusive rock contained dissolved gases of various kinds, among which water above the critical temperature predominated. The intrusion cracked and shattered the surrounding cold rock, and through the fissures, as well as through the pores of the rock, these hot gases rapidly pressed outward, enormously increasing the heated zone and the zone in which chemical action was produced. The very varying width of the contact metamorphic zone in different rocks confirmed, he thought, this view. The intensity of metamorphism was in proportion to the amount of the gases contained in the magma and to the shattering and porosity of the surrounding rock. We had to admit, in the speaker's opinion, that in many cases temperatures above 370° C. must prevail perhaps hundreds or even thousands of feet from the contact, and consequently the water must be in the gaseous state.

All this, continued Mr. Lindgren, presupposed that the active agent was pure water. As a matter of fact, we actually had water charged with gases and other substances. The critical temperature of this mixture was not known, but it was probably not greatly different from that of water. Carbonic oxide, hydrogen sulphide and many combinations of fluorine, boron and chlorine had low critical temperatures and would certainly exist as gases at a temperature of 370°. Great migrations of material had undoubtedly taken place at the contact in many instances.

Mr. F. L. Ransome, continuing the discussion, agreed with Mr. Lindgren in considering the class of siliceous magmatic segregations as lacking sufficient evidence for acceptance.

While admitting the connection of most metalliferous ore-deposits with eruptive rocks, and the significant association of characteristic contact-metamorphic minerals in certain ore-deposits, Mr. Ransome was not fully prepared to accept the view that such deposits were entirely pneumatolytic, that is, that they were wholly the work of gaseous substances given off above the critical temperature. It was agreed that gaseous substances were emitted from cooling magmas, particularly when such magmas were suddenly relieved of pressure by eruption near the surface. But it was not certain that magmas were so saturated with these gases as to give them off in great quantities under the conditions of temperature and pressure supposed to obtain in deep-seated intrusions. Moreover, while the mineralizing effects of such gases might be granted, these effects semed in the main to consist in the crystallization of materials already present in the solid acted upon. Thus most of the experiments cited in illustration of the effect of mineralizing agents indicated that the latter induced crystallization of amorphous material, and might not themselves enter into the combination. Now, ore-deposits, as a rule, were local concentrations of substances generally but sparingly present in the rocks. They implied extensive migration of material, and it was difficulty, Mr. Ransome considered, to account for this great transfer and concentration of material through the action of gaseous emanations from molten magma unaided by other agencies, such as heated waters.

He was inclined to believe that the principal ore-deposition took place, as a rule, after the solidification of the magma, and that the greater chemical and physical activity imparted to underground meteoric waters by the local increase of heat was more efficient in the formation of most ore-bodies than pneumatolysis. If Prof. Van Hise took too little account of gaseous emanations from molten magmas, the present scheme seemed to swing somewhat too emphatically to the other extreme, in assigning too large a share in ore-genesis to pneumatolysis alone. It was the present opinion of the speaker that most of the deposits grouped under class IV of Mr. Weed's table might be deposited by heated aqueous solutions unaided by gaseous emanations from molten magma. In this connection it might be noted, apropos of remarks made by members of the "igneous school," that those who were inclined to assign to meteoric waters a large share in ore-deposition did not necessarily maintain that the ores were concentrated by *cold, descending* waters, from *cold* rocks, or that igneous intrusions had no part in the process.

In making the foregoing remarks, the speaker did not wish to be interpreted as belonging either to the *descensionist* or *igneous* school as described by Mr. Weed, but rather as occupying intermediate ground in substantial accord with Mr. Emmons.

NEWFOUNDLAND MINING IN 1902.

We are indebted to Mr. James P. Howley, head of the Mines Department of Newfoundland, for the figures in the following table, which give the production of the mines and quarries of the island during the year 1902:

		Quantities.	Values.
Copper ore	tons	71,482	$247,060
Copper (estimated contents or ore)	tons	2,586	630,326
Gold (est. contents of ore)	oz.	4,000	82,680
Iron ore	tons	728,721	728,721
Pyrite	tons	26,000	117,000
Baryte	tons	315	630
Building stone	tons	5,000	6,000
Cobble-stones	tons	500	500
Granite	tons	2,955	17,730
Limestone	tons	1,150	345
Paving stone	tons	2,250	18,000
Slate	tons	3,500	44,000
Brick, made	M.	1,625,000	18,950
Lime, made	bbl.	3,100	.....

With reference to the above table, the copper ore was all exported, 35,947 tons going to Great Britain and 35,538 tons to the United States. The copper is the estimated metallic contents of this ore. The gold was obtained almost entirely from the copper ore and necessarily estimated, as no direct returns are obtainable. The ore is smelted at the works of the Nichols Chemical Company in this country and at those of the Cape Copper Company in England. The iron ore was all exported, 81,920 tons going to the United States; 107,189 tons to Great Britain; 204,720 tons to Germany and 328,050 tons to Nova Scotia, to the works of the Dominion Steel Company.

The pyrite was all exported to the United States The building stone, brick and lime were used in the country, but the slate, 11,000 squares (builder's measurement) went to England. The output of pyrite showed a considerable increase over the previous year. The brick and slate industry also showed considerable gains. The mining of barite was a new feature in the mineral production. One small cargo was shipped during the year, and it is expected that this will grow into a considerable industry, as the deposits are large.

During the year some promising gold finds have been made, and two mines are now in actual operation. One at Rose Blanche, on the southern coast, and the other at Sop's Arm in White Bay, on the northeast coast. Both are only in the preliminary stages at present, and neither has a mill erected, although the machinery for stamp mills is now on the

grounds. A number of miners are employed at each locality, opening the mine and getting out quartz. The ore at Rose Blanche is said to be low-grade, the yield being $4 to $5 per ton, but there is an enormous body of quartz. At Sop's Arm the gold is free, and sometimes quite coarse, while some tests went from $10 to $15 a ton. The prospects are very good, and it is quite probable that some production of gold from one or both of these mines will be recorded in 1903.

NOTES FROM NEWFOUNDLAND.

By T. J. Freeman.

Gold.—The discovery of free gold last year at Sop's Arm in the White Bay District on the north coast created local excitement. About 50 claims were staked in one week. A stamp-mill is in course of construction. Large bodies of medium grade ore exist in the White Mountain range. A cyanide plant will start to work in March.

Silver and Lead.—In the district of Placentia, where all operations have been stopped for a number of years, some new discoveries were made during 1902. An American company will start work there shortly.

Manganese.—Large deposits, covering an area of ten miles, assaying from 35 to 41½ per cent manganese, exist at Topsail, Conception Bay.

Talc is found in large quantities in the same region. The Oxly Claim was sold in December last for $12,000.

Coal.—The coal mining industry of Newfoundland has met with very little success. If the large coal areas that are said to exist near the line of railroad, in the western portion of the country, prove good, smelting furnaces could be erected near the best iron ore locations, and this would give a great stimulus to the mining activities of the entire island.

EPSOM SALT IN WYOMING.

By Wilbur C. Knight.

Among the numerous superficial deposits of various salts in Wyoming, none possess greater interest than those of Epsomite, which occur in Albany County, about 20 miles north of Rock River station, on the Union Pacific Railroad. The deposits are situated upon a high plateau, about three miles north of Rock Creek, and lie in a huge, undrained depression that is deepest at its southern end, where it is about two

WABANNA IRON MINE, BELL ISLAND, NEWFOUNDLAND.

Copper.—Tilt Cove in the Green Bay District, on the north coast, after 40 years of activity is still jogging along, and with brighter prospects. The Blow-Me-Down Mountain Range at Bay of Islands, on the west coast, shows over 20 miles of copper-bearing country. The York Harbor property was sold last December to an American company for $400,000.

Pyrites.—The Pyrites mine at Pilley's Island in the Green Bay District has again resumed operations under the management of C. F. Taylor. Two new shafts have been sunk to about 300 ft., and large bodies of ore are said to have been cut.

Iron.—The Wabanna, at Bell Island, Conception Bay, on the east coast, continues to work on a very large scale during the summer months. Reports for the season ending June 30, 1901, show the following exports of iron ore to different countries, in tons:

United Kingdom	17,080
Holland	72,025
Germany	2,300
Canada	243,444
United States	120,705
Total	455,554

The output for 1902 was much larger; Germany and Holland made heavier contracts. At Mings in the White Bay District two large seams of high-grade hematite were located and extensive operations may be looked for in the spring. At Mount McCormack, about 40 miles inland from Bay-Des-Poire, in the Fortune Bay District on the south coast, large deposits of chrome iron have been traced for 15 miles. With better railroad facilities Mount McCormack would undergo rapid development.

miles wide, and lies a hundred feet or more below the level of the surrounding country. From this deepest portion a rather broad, shallow valley extends to the northwest for several miles and contains numerous small, together with a few larger, deposits of sodium and magnesium salts, which have for a long time been tributary to the large Epsomite deposit of about 90 acres in extent occupying the lowest portion of the basin. The prevailing formation is Red Beds (either Triassic or Permian), almost completely made up of red sandstones, which contain an abundance of gypsum near their base. The country is very arid, and the nearest palatable water is Rock Creek.

The deposits are often covered with water in early spring or after a hard storm; but this soon evaporates and leaves them solid Epsomite or an accumulation of mud sand and Epsomite. Near the northeastern quarter of the large deposit, and the only portion that has been carefully examined, the Epsomite occurs in a thick bed, but contains a good deal of foreign matter. Holes have been dug to a depth of ten feet in this salt, but the bottom has not been reached. While no accurate estimate has been made of the amount of Epsom salts in this deposit, it is certain that the tonnage is very great and that it would furnish sufficient salts to supply the American trade for many years to come. From the surface of this deposit there have been taken some of the finest crystals of Epsomite that have ever been discovered.

The origin of the deposit, and those that are associated with it, has long been in doubt. Those who have examined the region always express themselves as dumfounded at the occurrence of nearly pure Epsomite and other deposits of nearly pure mirabilite (glauber salt) in the same basin. In studying this problem I have ascertained that the salts have been derived from the decomposing sandstones, and have been transported by water to the natural depressions. Both the Epsomite and mirabilite occur in the rocks, but on account of the greater solubility of the former, the soda salts are often precipitated in a depression, leaving the Epsomite in solution. A sudden storm floods the deposit and carries the magnesium salts to a lower basin, if not to the lowest one. By this natural method of differentiation these salts have been separated, so that at the head of the valley the deposits are nearly pure mirabilite, while the main deposit is nearly pure Epsomite. The composition of the various deposits is shown by the samples, which are averages taken from the various deposits and analyzed by Dr. Slosson, of the University of Wyoming. The large deposit, however, often has a thick covering of Epsomite which is much purer than these samples.

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
$Na_2 So_4$	95.46	92.54	50.90	47.74	39.18	25.61
Na Cl	0.28	0.28	0.50	1.86	1.00	5.28
Mg So_4	4.26	5.29	48.60	50.16	59.82	70.11
Ca So_4	....	1.89	....	....	....	....

No. 1 of this series was taken from near the head of the gulch and the others from the intermediate points and the last from the large deposit. The series shows quite wide differences in the succession. These wide gaps would be filled by taking more samples from the intervening beds.

PIG IRON PRODUCTION IN BELGIUM.—The production of pig iron in Belgium last year showed an increase of 44.1 per cent, as compared with 1903. The figures are as follows, in metric tons:

	1901.	1902.	Changes.
Foundry iron	92,700	108,560	I. 15,860
Forge iron	166,955	256,435	I. 89,480
Bessemer and basic	505,765	737,915	I. 232,150
Totals	765,420	1,102,910	I. 337,490

At the close of 1901 there were 26 furnaces in blast out of a total of 39 in existence. At the end of 1902 there were 33 furnaces in blast, an increase of 7 over the previous year.

SUPERHEATED STEAM AS THE ACTING FORCE OF VOLCANIC ACTIVITY.—Prof. Angelo Heilprin, in referring to the cause of the Martinique disaster, says: "The opportunity that was presented to me at the time of the second death-dealing eruption of Mont Pelee of almost immediately visiting the field of destruction, of interrogating a number of the severely wounded, and of examining the bodies and clothing of some of the unfortunate dead, has forced upon me a somewhat different conclusion as to the nature or composition of the tornadic blast from that which I formerly held, for it is now made clear that the acting force—to whatever extent it may have been aided by other forces or agents whose testimony does not appear—was superheated steam, or superheated steam charged with hot ashes and lapilli. The evidence proving this, both at Morne Balai and Ajoupa-Bouillon, and, as Lacroix found it later at Morne Rouge, is, it seems to me, conclusive. This steam was shot out as a violent blast, and its mechanical force, withering heat, and possible mixture with other gas, shattered, asphyxiated, and scorched; and where charged with incandescent particles of solid matter, as in that part of its course which overwhelmed Morne Rouge, also burned. Neither at Morne Balai nor at Ajoupa-Bouillon did I find the faintest indication of anything having burned with a flame, or having been carbonized, not even the dry palm-thatching of the cases. The trees that were left standing were dry and largely stripped, and in the less destroyed zone the leaves hung to the branches, shriveled up as though having been rapidly passed through a dry-heat furnace or a scorch blast. The sap from the twigs was completely gone, and the branches and branchlets broke square across. There was nothing to indicate the passage of com-

bustible gases, and I failed to find—although my examination was not made with true minuteness—evidence of the presence or action of any of the terrestrial gases. A number of inquiries elicited the impression that sulphur was the only gas whose presence was detected in the passing storm, but even its action does not seem to have been badly felt.

"ORE DEVELOPED."—A DEFINITION.

By PHILIP ARGALL.

The phrase "Ore in Sight," so commonly used as an alleged measure of value in mine reports, is, in my opinion, a very poor expression. Taken literally, as the non-professional man is most likely to understand it, one cannot defend its use except as a misleading, if not deceptive, euphony.

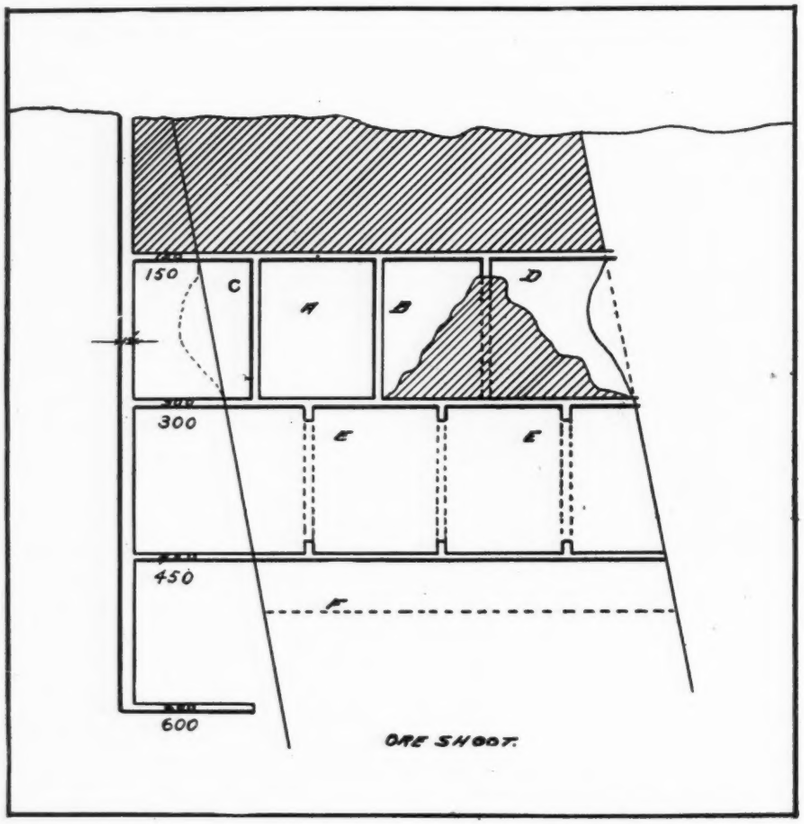
The only "ore in sight" in or about a mining property is that broken and displayed at surface in the ore-bins, or in dumps. Perhaps I should also include ore broken or visible in the underground workings; but this is not what is usually meant by "ore in sight" in mine reporte.

I believe the majority of mining engineers call vein matter blocked out and accessible for measuring and sampling on all four sides, or at the very least, on three sides, as "ore in sight," while strictly speaking it is only the four planes bounding the block that are visible to the physical eye. The "mind's eye" should have no place in such an estimate.

I take it that the whole purpose of sinking shafts and winzes, running cross-cuts, levels and raises, is, first, to open up and develop ore; and, secondly, to provide ready means to extract and market this ore when developed. Once a given piece of vein matter is blocked out by, say, two drifts, 150 ft. apart, and two winzes, 200 ft. apart, it has reached its highest state of development, that is, it is ready for removal by stoping; and it is also in the best form for sampling and measurement, in order to obtain a close estimate of its commercial value. I would submit, then, that such a block had best be called "ore developed" and not "ore in sight." The former phrase would correctly describe what it is, while the latter just as clearly shows what it is not.

"Ore developed" should in every case be accessible for measurement, sampling and full examination *on all sides.** Block A, on the diagram attached, showing four exposed sides, is perhaps the more usual form met with in a developed mine. Block B, however, with three exposed sides, also comes under our classification of "ore developed," as would also any irregularly shaped ore-body visible and fully accessible, on and along all portions of its perimeter.

Inasmuch as "ore developed" forms the subject of the highest possible, or most accurate, estimate engineers can make of ore in place, it should be hedged in with the invariable and unalterable requirement, *exposed on all sides* up to the full thickness of the ore. Under this condition the estimates of independent examining engineers should agree within the limits of experimental error. As a general rule, one is safe in stating that the smaller the blocks of "developed ore" the more accurately can their contents be estimated. These blocks, then, should be of moderate dimensions. In ordinary vein mining the levels are usually placed at intervals of 100 to 150 ft. apart, as measured along the dip of the vein. I would suggest as a safe rule, within these limits, that the length of such blocks of "ore developed" should not exceed twice their depth.



It may be suggested that it is not always imperative to completely block out ore-ground before stoping. Quite true. The parties, however, who are developing their mines for the purpose of selling them, would be well advised to do so. Otherwise the ore partially blocked out, and in various minor stages of development, must receive separate and lower classifications.

For blocks of partially developed vein material, hidden on one or more sides, I would suggest the phrase "ore being developed," or, for shortness, "ore developing." Two levels, say, 150 ft. apart, simultaneously penetrating an ore-shoot, are, as they advance, daily increasing the amount of "ore being developed," which, on further opening up by winzes or raises connecting these levels, and cutting the ground into blocks, becomes "ore developed."

"Ore being developed" naturally falls into three classes: First, where one side only is hidden; second, where two sides are hidden; third, where three sides are hidden.

* The planes called foot and hanging walls, are not considered as sides.

As an example of the first class, we will take block C, which on a casual glance might appear just as safe an estimate as block B. On closer examination, however, it will be noticed that on the hidden side, we can neither determine the assay value of the ore, its thickness, nor its actual termination. For example, if the shoot follows the heavy line, as one naturally assumes it would, we have data for a certain tonnage, while if it follows the dotted line, we have an increased tonnage. Similar remarks apply to block D, showing how the assumed tonnage might be decreased.

It is therefore abundantly clear that a given block of ground having one hidden side cannot be estimated as closely as one having all sides exposed, inasmuch as in the former about 25 per cent of the necessary data is unobtainable. We are therefore fully justified in excluding the block *having one side hidden,* from any estimate of "ore developed," or, if you please, "ore in sight."

Again referring to the diagram, Block E, with two sides hidden, cannot in the very nature of things be estimated as closely as blocks C and D, hence we class it "ore developing," second class, while block F, with three sides hidden, very naturally falls into the third class estimate of "ore being developed."

We next come to the future value of the ore shoot. In other words, to what depth will the pay-ore extend? We assume the ore shoot is of fairly uniform dimensions and value; that it continued so to the lowest point of exploration, the 450-ft. level on our diagram. The experience in the district went to show that the horizon of pay-ore extended to 1,000 ft. In this case the ore is not even in a stage of "ore developing"; it may be entirely invisible, yet one has reasonable assurance from the appearance of the vein and ore-shoot, from the experience obtained in adjoining properties, and from other physical phenomena, that pay-ore exists in this shoot to a depth of at least 900 ft., consequently the engineer, after making such allowances as he deems safe, looks forward with confidence and reasonable assurance that the shoot of pay-ore will extend to some considerable depth, perhaps to 1,000 ft. This I class as "ore expectant." It deals rather with the future than with the present, and more in the region of the imagination than of fact, but is nevertheless an important factor in every mine valuation, dealing as it does with the probable life of the property as a producing mine.

"Ore expectant" is perhaps the most difficult estimate, if estimate it can be called, that engineers are compelled to make, because of the few facts available; hence it is only to be supposed that opinions and estimates of different engineers must widely vary. While, therefore, with "ore developed" the highest and most accurate estimate of ore in place can be made, "ore expectant," in the same sense, forms the lowest and least accurate. Very few, if any, mine owners would sell a property for the net value of the "developed" and "developing ore," unless they had good reason to believe the mine to be practically bottomed; hence the necessity of having a phrase to cover such estimates, as well as uniform and thoroughly recognized rules to govern their compilation.

These three phrases, "ore developed," "ore being developed," and "ore expectant" should cover, in metalliferous mines, all estimates a mining engineer is called upon to make. I now put them forward for the consideration of the profession, not as the best possible names and classifications, but as sound, useful and definite phrases to govern ordinary estimates of mine valuation. They will cover any condition I have met with in a practice extending over 25 years in this and other countries; and they have not only proved useful in my work, but are also the best phrases I can evolve to correctly designate clear and concise estimates.

Every report on a mining property should give the cost of stores, the mining and milling cost, and the gross and net values of the ores; therefore it should not be a necessary requirement to have "ore developed" always pay-ore. The gross and net values

at the time the examination is made will fully govern the then value, while at later dates the improvements in mining and milling can usually be depended on to increase the net value, often to the extent of showing good profits, in the course of a few years, on formerly practically valueless ores. The gross value is, when reported in ounces and percentages of metals, always a fixed point of departure, from which the net value can at all future times be deduced when the price of the metals and cost of treatment are taken into consideration.

It may be, the ambiguous phrase "ore in sight," is so deeply rooted in the minds of mining operators, promoters and investors, that it cannot well be replaced by a better one. I hope this is not so; nevertheless, should these notes provoke a sound discussion of the whole subject, preparing the way for definite classifications of ore estimates, with clear and concise rules governing each class, I shall feel that my efforts have been to some purpose.

In conclusion, permit me to state that the various methods of mine sampling, and the possible errors in estimating tonnage and value, are excluded from the scope of this letter. I simply desire to present for the consideration of mining engineers the classifications above outlined, and which I summarize as:

Ore Developed.—Absolutely and without variation, ore exposed on all sides.

Ore Being Developed.—First class, blocks with one side hidden; second class, blocks with two sides hidden; third class, blocks with three sides hidden.

Ore Expectant.—The prospective value of a mine beyond or below the last visible ore, based on the fullest possible data (clearly set forth) from the mine being examined, and from the characteristics of the mining district.

THE FEDERATION OF TECHNICAL SOCIETIES IN ENGLAND.

By Edward Walker.

The time appears to be not far distant when a federation will be affected among English technical societies, not with a view to amalgamation or uniformity of membership, but to enable the engineering profession to take concerted action and to draw the various sections of the profession into closer communion. Originally the Institution of Civil Engineers represented the profession in its entirety, and the subjects discussed at the meetings covered the whole of the ground. On reading the charter at the present time the first impression given is that the subjects to which the Institution is devoted are restricted to what we now consider as civil engineering, but on further thought it is apparent that in those days roadmaking, water works, and bridgebuilding were the chief, and by far the most important, duties of the civil, as contrasted with the military, engineer; and that the reason why what is now known as mechanical, electrical, metallurgical and chemical engineering and naval architecture are not expressly referred to in the charter, is due to the fact that these technical sciences were either in their infancy or non-existant at the time. Electrical engineering was quite unknown, and the refinements of the steam engine, the complication of machine tools, large and small, and the other industries now represented by the Institution of Mechanical Engineers had not been developed.

Most of the influential members of the Council of the Institution of Civil Engineers have continued to hold the view that their Institution represents the whole of the engineering profession, and judged by the considerations above named they had a right to think so. The younger generation of civil engineers are inclined to modify such views and there is a movement on foot for an entire revision of the relative positions of the various institutions, their objects, and their scope. The writer shares this view of the necessity for a change which shall meet the altered conditions of the profession. It is time that the Institution of Civil Engineers abandoned its claim to be the one central body with the other societies as merely subsidiary and devoted to special branches. The Institution should certainly take rank as the oldest, richest and most influential society of its kind, but it should reduce its field to the subjects now commonly associated with civil engineering, and recognize the Institutions of Mechanical Engineers, Electrical Engineers and Mining Engineers, the Institution of Naval Architects and the Institution of Mining and Metallurgy as equal in rank, and competent to deal with their own specified branches of engineering. On such a basis a scheme of federation could be easily arranged, and the interests of the profession advanced in a spirit of unity. One advantage accruing would be the cessation of needless rivalry in the securing of papers to be read. The civil engineers would not have papers on nickel alloys nor on machinery for crushing ores, while the mining engineers would confine their energies to iron and coal and other home mining industries, and the Institution of Mining and Metallurgy would deal with gold, lead, copper, and with other matters of interest to the Englishman investing in mines abroad.

A subject of importance to the engineering profession that should receive attention, in a systematic manner, is the provision of funds for the benefit of distressed members. With the exception of the benevolent fund worked in connection with the Institution of Civil Engineers, engineers are quite unprovided with anything of the sort. The Civil Engineers' fund is not operated by the Institution itself, but by a specially appointed committee, and no part of the members' subscription to the Institution goes towards the benevolent fund, the subscriptions to the fund being entirely separate and voluntary. Neither membership of the Institution nor the fact of being a contributor to the fund constitutes a claim to participation in the fund. The writer has often wondered that the Institution has not devoted some of its surplus cash to some systematic scheme for benefiting its members, arranged in such a way that membership alone should confer a right to participate in certain specified eventualities, such as premature death while in the pursuit of the profession, leaving family unprovided for, disablement under similar circumstances, and reduction to poverty through the faults of others. It is to be hoped therefore that when the various technical societies have agreed to federate one of the first undertakings will be to organize a benefit scheme on a liberal scale, applicable to the members of each individual society.

THE VERMILLION IRON RANGE IN MINNESOTA.

By D. E. Woodbridge.

There is unusual activity in exploration on the Vermillion Range of the Lake Superior iron ore region, and if no ore is found during the present year there will be a disappointment from which this region will scarcely recover in a decade. All exploration on the Vermillion Range is being done by diamond drill, and as the rock is largely siliceous ore and jasper, with sometimes a hard quartzose diorite which is worse drilling than anything else, the work is very expensive. The ore of this range is quite frequently brecciated and the danger of "losing the hole" is not infrequent, so that only the very best stones and the most expert men are successful. The jasper is so hard that a bit will often cut only a few inches before it must be reset, for as soon as the stones grind a trifle they will refuse to cut further and must be replaced. In the flinty diorite sometimes encountered, the stones will continue to grind down and wear away seriously. An immense amount of diorite has been drilled on the range in past years, and this is usually easy and cheap work, but as the exploring companies are not looking for greenstone this fact is not helpful.

The ore-deposits first opened up on the Vermillion Range are at Soudan, where, in 1882, the first mining development in the State occurred; the discovery of these mines brought about the building of the Duluth & Iron Range Railroad, and the development of Minnesota as a mining region. Later, in 1886, the outcrop of the Chandler Mine was opened up, and the Ely basin was developed. This is 21 miles east from Soudan, and is a far larger and more important district. It produced last year 1,800,000 tons, an output which will be increased during the current year. It is a strange thing that after all the enormously costly and careful explorations that have been carried on between these points, and on either side of them, since the first finds, no new ore lenses have been discovered. In single seasons hundreds of thousands of dollars have been expended in drilling, without result. A great deal of this work has cost up to $10 and $12 a foot, possibly more, data on this matter being hard to secure. As the Soudan ore-bearing formation lies nearly vertical in many places and goes to great depth, and as ore is not expected near the surface, this sort of work runs into money. Ore, in bodies of workable size, has been found on this range east from Ely at depths of more than 1,250 ft., so that 1,000-ft. holes are not at all exceptional.

At the present time drilling is in progress in townships 62 range 14 and 63-11, on a large scale. The Oliver Iron Mining Company is drilling in section 14, 62-14, with three machines, one of which is down more than 800 ft. The same company is soon to drill in section 4, same township, where it has a known ore-body, the size of which is as yet undetermined. Shafts were sunk there some years ago and a stockpile of several hundred tons of good ore is now at surface, but the shaft work was unsuccessful and drills are being introduced. This is known as the Sheridan property, and is regarded as of much promise. The formation shows basins of jasper, slates and conglomerates. In sections 13 and 14, same township, where the work of the McComber Mining Company brought out several hundred tons of splendid hard hematite, the Mahoning Ore and Steel Company is to explore with drills in the hope of locating a large body.

In township 63, range 12, which is the Ely District, much exploration will be carried on this year by drill. The Mahoning Ore and Steel Company has a large acreage, lying between the Ely mines and the famous "Section 30," and is under contract to sink a number of holes. The formation is largely diorite and a heavily banded jasper bluff runs off to the east and north, inclosing a part of section 30.

On this latter tract a contract for drilling has just been let to the firm of Cole & McDonald, of Duluth, the leading diamond drilling firm of that district, and the first drill has gone to work. Indications are generally thought to be very favorable and two well defined basins are regarded as likely to contain ore. The Section Thirty Company has been organized with heavy Eastern interests back of it. This land is noted as having been won by the present owners after a most hotly contested and costly litigation. The fight has been going on since 1883, and is but now ended, successfully for the original locators, some old time explorers and landmen of Duluth. If the property becomes a mine they will reap a rich reward. East of section 30, and in the same township, Messrs. Swallow & Hopkins, R. Whiteside, Leonidas Merritt and the Mahoning Ore and Steel Company have all been at work, with no particular success to date. No work is under way on the range east of this township, and none west of Soudan. Townships 63-11, 63-12, 62-14, 62-15 (this last work being in the Soudan mines) comprise all the diamond drill work now in progress on the Vermillion. Operations were under way until quite recently by the Sharon Ore Company in the northern part of 61-15, but when the United States Steel Corporation bought this concern work was suspended.

The ores of the Vermillion Range are especially desirable. They consist of hard or brecciated hematite, very high in iron and low in phosphorus. Standard assays from actual season shipments from leading mines average from 63 to 67 per cent iron and down to 0.030 per cent phosphorus. These ores are especially desirable as a mixture with finely comminuted soft ores in the blast furnace, and they are almost the only high-grade bessemer hard ores mined in quantity in the Lake Superior region.

There is no greater mistake than the hasty conclusion that opinions are worthless because they are badly argued.

THE CONCENTRATION OF ORES BY OIL.

By Walter McDermott.

The selective action of oil and grease on certain minerals has been made known by a number of independent investigators for some years, and several attempts have been made to utilize this knowledge for the purpose of a commercial separation of valuable products.

At the De Beers diamond mines such a process has been successfully developed and used for several years. The application is in the form of a shaking riffled table, coated with thick grease, over which tailings from the washing pans are run; with the result that any diamonds present adhere to the grease, while the waste rock flows over freely. The attempt to use a thin oil for separating metallic sulphides from waste rock was made in England; and a certain measure of success was attained in small experiments by causing the oil to pass through a moistened mass of ore. It was found that the oil used had very little supporting power; that it attached itself to the gangue to such an extent as to cause excessive loss; and the details of an effective separation of the sulphides from the supporting oil were not worked out.

Mr. F. E. Elmore, in experimenting to reduce the excessive loss of copper and iron pyrites from a concentration mill in Wales, took up the investigation and was successful in developing a practical and economical method of utilizing the remarkable power of some oils to absorb certain minerals and metals. The description of the action of the oil as "absorption" will be allowed to pass by those who have seen the process in actual operation; it is entirely a surface action as between the oil and the wet particles of mineral, but in effect the result is that the particles enter into the body of the oil. The essential points of the process, on which its novelty and commercial success depend are (1) the nature of the oil used, (2) the method of its application to the crushed ore, (3) the separation of the absorbed mineral from the oil.

1. Experiments, made with many varieties of oil and fatty substances, resulted in the discovery that an oil of the character of the thick residuum of petroleum distillation gave results far more effective than any other material; and, in addition, had advantages in its low first cost, its freedom from mechanical loss even when finely broken up, and in its power of supporting a relatively heavy charge of mineral without sinking in water, all of which gave its use the distinction of an absolute discovery as compared with the previously known characteristics of other oils. Besides the ordinary American residuum, having a specific gravity of about 0.88, similar products from other parts of the world have been found equally effective, particularly some natural thick oils from the East, with a specific gravity of 0.80. The factor of specific gravity is of importance, because the oil when charged with particles of heavy mineral has still to float freely in water. The capacity of the oil to thus support a charge is greater than would appear possible by calculation based solely on its normal specific gravity; because in practice the agitation with the pulp results in the oil taking up a very appreciable quantity of air, giving a certain sponginess, with natural increase in floating power. The properly charged oil, when examined with a glass in a thin film, is seen to be literally full of particles of mineral it has taken up; and its power of still floating appears remarkable. When over-charged with mineral, a portion of the latter settles out and sinks in water, dragging down entangled oil with it; some of this oil, shaking off the excess of load, will again rise in globules to the surface. The degree of viscosity is of importance as regulating the charge the oil will carry, and as affecting the mechanical loss from its influence on sub-division and re-agglomeration: but, fortunately, this degree of viscosity can be easily regulated by the addition of thinning or thickening oils or wax, and in part, if necessary, by the regulation of temperature in working. It has been discovered that the action of the oil on some ores can be stimulated by mixing certain acids with the oil itself at a very nominal cost; or by the addition of a very slight quantity of acid to the pulp before the contact with oil. This increase of efficiency is in some cases—such as in the treatment of Atacamite ores—sufficient to make the difference between success and failure; and is secured by the addition of quantities which are little more than traces of acid. Mine-water of acid reaction is therefore well adapted to the process. When water is scarce it can be used over again after settling the tailings, as some extra muddiness is not injurious.

2. The use of the thick oil allowed of its application to a thin pulp, such as that produced in all wet crushing operations where an excess of water is always used, and previous efforts with other classes of oils had been unsuccessful with a thin pulp. Experiments were made with differing degrees of agitation of the oil with the flowing pulp; varying all the way from a gentle rolling over of the oil and pulp, in their travel down an inclined riffled launder, to a violent agitation such as produced by passing through a centrifugal pump, or a cone mixer, or an amalgamation pan. The attempt to pass the pulp as a spray through a floating layer of oil, was followed by the flowing of the pulp both over and under a fixed and a traveling surface coated with oil. In the end it was found that a slowly revolving cylinder with a helical launder within, fitted with low baffle plates at intervals, gave a sufficient agitation for most ores, and caused no unnecessary breaking up of the oil, while insuring a clean concentrate, because there was no mechanical driving of particles of gangue into the oil. As a consequence of the experiments with many classes of ore under varying conditions, a standard type (or unit) of three mixing cylinders has been adopted, and will be more fully described later.

For some ores, requiring very close saving of a rich mineral finely divided in the gangue, extra agitation previous to treatment in the mixing cylinders has been found effective.

The application of the thick oil to a thin pulp, allows of a simple, continuous and automatic treatment of the flowing product from a stamp-mill or other pulverizer. After the mixing of the oil with the pulp—which may be likened to the agitation of quicksilver with an ore in pan amalgamation—the oil with its charge of mineral is separated from the water and waste rock by running the whole into a large pointed box, from the bottom of which the rock and water flow, while the oil and mineral float on the top and overflow for subsequent treatment. This separation is the equivalent of the separation of quicksilver and amalgam from the rock and water in a settler; although in the one case the heavy absorbed mineral is floated off by the oil, and in the other case the amalgamated metal sinks with the quicksilver.

The similarity of the operations to those of amalgamation seems to have struck the patent examiners in Washington; for in the broad claims granted for the process the use of quicksilver was specifically excluded.

3. Having secured the right kind of oil, the proper agitation with a thin pulp, and the separation of the oil and its absorbed mineral from the waste rock and water, the difficulty of a simple and effective extraction of the mineral from the oil was only overcome after a great deal of experimenting. Most of the particles of mineral produced in crushing an ore by stamps are very minute, so that the problem of their extraction from the body of a thick sticky oil was not easy. To thin the oil sufficiently to allow the concentrates to sink, was found commercially impracticable; either by addition to the oil of any thinning material, or by raising the temperature. Filter-pressing (after heating) was found unsatisfactory for several reasons; and success was only obtained by the adoption of a system of centrifugal separation carried out under perfectly novel conditions of working. The oil is passed through a heater into a centrifugal machine consisting of a vertical pan 48 inches in diameter, which has an inwardly projecting flange at the top, round and over which the discharge takes place. Water is run first into the centrifugal and forms a wall of the depth of the flange. The heated oil flows down a pipe into the bottom of the pan (which runs at 1,000 revolutions per minute) and passes up in a thin layer over the wall of water, discharging over the flange at the top. During this passage of the oil over the water the solid particles of mineral are thrown out, through the supporting water, and pack against the side of the pan. When the pan is charged with mineral it is stopped for a few minutes, the collected wall of concentrates is broken down through an opening in the bottom of the pan (which opening in running is kept covered) and the machine is started again ready for a fresh charge. The cleaned oil flowing from the centrifugal is pumped back to the storage tanks above the mixers, for re-use after cooling. The separation of the mineral from the oil is very perfect. A sample

SYGUN 20-STAMP OIL CONCENTRATION MILL.

of the oil now in circulation in the London testing works, and which has been used with a great variety of ores, contained on examination only 0.15 per cent of solid matter.

The discharged concentrates have still some oil and water mixed with them, and are dried by treatment in a second centrifugal fitted inside with a perforated pan, such as is used in drying sugar.

(To Be Continued.)

DEEP MINING IN THE TRANSVAAL.*

By H. H. Webb.

Mr. Hennen Jennings has said that: "Working at great depths is handicapped by the following:

"1. The greater length of time necessary to make the ore deposit interest-producing.

"2. The liability of encountering temperatures detrimental to economical working.

"3. The danger of encountering great quantities of water, and the extra cost of pumping.

"4. The extra cost of hoisting ore, men and materials."

Rate of Sinking Deep Shafts.—While it may be considered unwise to count upon a greater speed in shaft sinking, for such depths as 5,000 and 6,000 ft., than a hundred feet per month, the writer believes this can be exceeded, and as a matter of interest gives the records of the Catlin and Howard shafts since sinking commenced in these.

Sinking in the Catlin shafts was started in June, 1896, and was suspended in March, 1897. During this period 906 ft. were sunk, or an average of 90.6 ft. per month. Sinking was re-started in this shaft in January, 1898, and for the 12 months of that year ending December, 1898, 1,695 ft. were sunk, or an average of 141 ft. per month. Work was suspended in September, 1899, on account of the approaching war, but during the nine months of 1899 when sinking was carried on, 1,151 ft. were sunk, or an average of 144 ft. per month. The average per month for the 31 months during which sinking was carried on from the very start is 121 ft. It will be seen that the rate, however, has steadily increased.

Mr. Jennings says: "With good fortune a vertical shaft might be sunk and the necessary development work accomplished to start 100 stamps in, say, seven years," etc.

Assuming that two years of this time is taken up in developing after the reef is encountered, the rate of sinking the 5,500 ft. would be about 91.7 ft. per month for the five years. The Catlin shaft having reached a depth of 3,752 ft. in 31 months, has only 1,748 ft. to make in 29 months, or an average of about 60 ft. per month, to reach the depth of 5,500 ft. in the five years. Surely in the face of the work which has been done, interrupted as it has been by stoppages and approaching war, to lessen the footage during certain months, we could expect something better than 60 ft. per month for the remaining 1,748 ft. to carry the shaft down to 5,500 ft.

Turn now to the Howard Shaft of the Simmer & Jack West. Sinking was started here in May, 1896, and suspended in March, 1897. During this period 891 ft. were sunk, or an average of 81 ft. per month. Sinking was resumed in this shaft in January, 1898, and for the 12 months of that year ending December, 1898, 1,551 ft. were sunk, or an average of 129.2 ft. per month. Work in this shaft was stopped on account of the approaching war in August, 1899, but during the eight months of the year 966 ft. were sunk, or an average of 120.7 ft. per month. The falling off here from the footage done in 1898 is slight, and largely due to the interruption of work on account of the approaching hostilities. In this case, 2,092 ft. would have to be sunk in 29 months to fill out Mr. Jennings' time of five years for 5,500 ft., which would be an average of only 72 ft. per month to accomplish the remaining distance.

The rate of sinking in other shafts might be mentioned, as in the Milner, formerly the Rand Victoria Shaft, and the Rudd Shaft, the former on the South Geldenhuis Deep property, and the latter on the South Rose Deep. These shafts, before the formation of these companies, were on Simmer & Jack ground, and work was suspended in them by that company in November, 1896, and resumed again in July and August, 1898, by the above companies. In the Milner shaft, from the 1st of August, 1898, to the 31st of August, 1899, the average rate per month was 152½ ft., the depth at the latter date being 2,739 ft., and in the Rudd Shaft from September 1, 1898, to September 30, 1899, the average rate per month was 138 ft., the depth at the latter date being 2,425 ft.

As the rate of shaft-sinking is largely regulated by the speed with which the broken rock after blasting is removed from the bottom of the shaft, it is obvious that if two winding engines were used for this purpose in sinking a large seven-compartment shaft, or if the ropes from one winding engine were carried down the second and sixth compartments, respectively, and four buckets used in sinking, two in each of these compartments, so that one bucket would always be in course of loading at each end of the shaft, the rate of sinking above quoted might reasonably be exceeded. It will also be observed, by referring to Mr. Jennings' discussion, that in the opinion of many miners better progress by sinking across the formation can be made than when the shaft is located with its long axis in the direction of the strike of the reefs, the practice heretofore. Hence, I believe that greater speed than 100 ft. per month can be counted on in sinking a shaft, even 6,000 ft. deep, if the work can be carried on without interruptions from start to finsh, and thus there will be a lessening of the period heretofore considered necessary to reach the productive stage.

Increase of Temperature in Depth.—As to the liability of encountering temperatures detrimental to economical working, Mr. Marriott prior to the war, collected data on this subject in twelve mines. Starting with a mean temperature of 68.75° F. at 1,000 ft. in depth, which figure has been more or less confirmed at the Robinson Deep, he estimates that the rock temperature at 8,000 ft. would be 102.35°, and at 12,000 ft., taking the ratio of increase from 1,000 to 8,000 ft., it would be about 121.5° F. These rock temperature, Mr. Marriott estimates, will be reduced at least 10° by natural ventilation when connections have been made underground, and this appears to be borne out at the Robinson Deep. I may add that a greater reduction than 10° is estimated by others. Mr. Behr, the writer, and others on these fields have worked in the mines of the Comstock, Nevada, at a higher temperature than this, where thermal waters showing a temperature, according to Dr. Becker, as high as 170° F. were continually generating heat which tended to maintain the air temperature. In spite of this, temperatures were known to fall rapidly when connections were made, as, for intance, quoting from Le Neve Foster on the temperatures of the Comstock Mines:

"The highest temperatures were observed when long levels were driven without any ventilating shafts or winzes. As soon as a proper air current was established, the temperature usually sank rapidly; thus the temperature stood at 130° to 140° F. in a drift at the 1,850-ft. level of the Bullion Mine, but when connection was made with another shaft the thermometer went down to 100° F."

The same authority also quotes heavy falls of temperature in the mines of Cornwall after connections have been made. Mr. Thurston has noted a similar fall in temperature from 100° to 75° in the New Chum Railway Mine, Bendigo, Australia, at a depth of between 3,000 and 4,000 ft., when a cross-cut was connected by a raise with the level above, and we may expect 111.5° here to be reduced by artificial ventilation. Hence, if Mr. Marriott's data and conclusions are to be relied upon—and they are the data upon which the late Major Seymour worked—12,000 ft. is presumably not an impossible depth at which to mine these banket formations from a temperature point of view.

Increase of Water.—In my opinion, any large quantities of water will be met near the surface at a depth of, say, not greater than 1,000 or 1,500 ft. The Witwatersrand is the highest watershed in this part of the country. There are no mountains, snow-capped or otherwise, above us, and the water encountered is, the writer believes, purely surface water, or rain-water impounded underground near the surface. In this connection the writer would introduce evidence given by himself before the Water Commission recently sitting in Johannesburg.

"The Robinson Deep pumps from its shafts about 88,000 gals. per 24 hours; 60,000 gals. come from a point about 166 ft. down the shafts. The lowest level in the mine is 2,500 ft. below the surface, and is comparatively dry.

"The Milner Shaft at the South Geldenhuis Deep, which is 2,746 ft. deep, made in 1899 only 3,150 gals. per 24 hours, the first flow of water coming from a point about 175 ft. down the shaft, and the second flow about 1,200 ft. down. Below this point the shaft is comparatively dry.

"The Rhodes Shaft of the South Geldenhuis Deep, which has attained a depth of 2,015 ft., produced about 28,820 gals. in 24 hours, 28,280 gals. being lifted from the 500-ft. station, and 540 gals. from about 1,800 ft. down the shaft.

"The Howard Shaft of the Simmer & Jack West, which is 3,408 ft. deep, produced 11,500 gals. at about 250 ft. below the surface, and only 320 gals. at 1,300 ft. down the shaft per 24 hours. Below this point the shaft is dry.

"The Catlin Shaft of the Jupiter Gold Mining Company, which is 3,752 ft. in depth, gives 4,608 gals. at 130 ft. from the surface, and 1,840 gals. at the 1,500-ft. mark per 24 hours. Below this point the shaft is dry.

"The West Shaft of the Witwatersrand Deep, with a depth of 1,500 ft., produces about 5,000 gals. per day, the greater portion from near the surface.

"It is to be expected that there will be in these some increase of water as development work progresses, but present workings of the deep shafts of the Rand seem to point to a very material decrease in the amount of water to be obtained from the deeper mines."

The Angelo Deep, however, should be quoted. The East Shaft of this property was sunk to a depth of 2,300 ft., and had two pumping stations, one at 250 and the other at 500 ft. below the collar of the shaft, and the water produced per day was about 2,000 gals. There was no water below the lower pumping station, but from the bottom of the shaft a 2½-ft. bore-hole was put down a further depth of 1,968 ft. Water was encountered in this bore-hole at 240 ft. below the bottom of the shaft, producing about 1,500 gals. per day. Below this point in the bore-hole no water was encountered.

The West Shaft was sunk to a depth of 2,468 ft., and had one pumping station at 250 ft. below the surface. The water produced was about 2,000 gals. per day—and no water was encountered below this station. A bore-hole was also put down from the bottom of this shaft a further 1,393 ft., and at 600 ft. below the bottom of the shaft a flow of water was encountered, producing from 2,000 to 3,000 gals. per day, and coming up under considerable pressure. Below this the bore-hole gave no water.

The Connor Shaft of the Knights Deep Company will be cited on account of the excessive quantity of water encountered; but none of the 16 shafts surrounding it on all sides produce an abnormal amount of water. Of those properties immediately adjoining the Knights Deep: The Western Shaft of the Glencairn gives 90,000 gals. per 24 hours and the Eastern Shaft 40,000 gals. At the Witwatersrand or Knights, the pumping for the whole mine is done through the central shaft (there being three shafts) and is about 175,000 gals. per 24 hours in the dry season. In 1899 at the Wit Deep, the Western Shaft gave 5,000 gals. per 24 hours, and the Eastern Shaft 23,000 gals. Since the mine has been opened up by development these figures have increased to 15,000 gals. for the former and 52,000 gals. for the latter shaft. At the Knight Central

* Abstract from "Discussion on Winding Plants for Great Depths" as read before the South African Association of Engineers. Abstracts of previous papers, referred to in the present discussion, were published in the Engineering and Mining Journal, November 29, December 6 and December 13, 1902.

the Western Shaft gave 64,000 gals. per 24 hours, and while the Eastern Shaft had not been worked for some time, it formerly gave about the same quantity as the Western Shaft.

The two shafts of the Simmer & Jack East, Limited, give about 150,000 gals. each, while both shafts of the Glen Deep give about 100,000 gals. in 24 hours.

I venture to state that if the Connor Shaft was sunk another 1,000 ft. the bottom would be comparatively dry. But should water be encountered in depth, and bailing be necessary, I believe that water can be bailed in two stages as advantageously as rock can be hoisted in two stages, and from 50 to 80 per cent more than can be bailed in one lift from the same total depth.

Extra Cost of Hoisting from Great Depths.—One is hardly prepared to form any estimate of what these costs will be, as, in view of present conditions, considerable time will probably elapse before any mills on the Witwatersrand will be supplied with reef through 5,000 or 6,000 ft. vertical shafts; but as to working cost in general, the equipments to be erected will be new, and it is fair to assume modern and up-to-date in every particular. Surface expenses and milling, cyaniding, etc., should be reduced, especially with large plants, and one might venture to hope also that the expected all-round reductions will operate favorably for hoisting and mining at these depths, and the mining operations generally be aided by mechanical inventions both above and below ground.

Let us consider what can be done through one shaft at depths of 5,500 or 6,000 ft., winding in two stages. The latter depth taps the reef at a lower point on the dip, and hence nearer the extreme limit of mining. The writer has taken two stages because he believes it is safter than winding in one stage from these depths, and also because it greatly increases the working capacity and permits of the maximum use of the costly vertical shafts.

We may assume the shaft to have seven compartments, and to be placed across the formation—both of these ideas have been suggested and talked of before this discussion. Let us consider the capacity of two compartments of a shaft, winding in two stages from a depth of 6,000 ft. First as to handling rock. The upper stage being about 3,200 ft., with a maximum rope speed of 3,000 ft. per minute, 75 seconds' time required for the trip and 15 seconds' stop for loading and discharging, we would have:

$75 + 15 = 90$ seconds for each load, or 40 loads per hour.

Considering first a 4-ton useful load: $4 \times 40 =$ 160 tons per hour. Assuming Mr. Jennings' figure of 25 per cent as sorted out, this deducts 40 tons per hour. If we wind only 6 full days to supply the mill running time of 7 days, this would be 103 tons average per hour for the mill running time of seven days; assuming 5 tons per day crushed per stamp, which is about Mr. Jennings' estimate for a mill running 28 days per month, we would have:

2 shifts of	8 hours each	1,648 tons 329.6 stamps.
2 shifts of	10 hours each	2,060 tons 414.0 stamps.
3 shifts of	8 hours each	2,472 tons 494.4 stamps.

If the useful load is increased to 5 tons, we have:

5 × 40	200 tons per hour.
25 per cent sorted out	50 tons per hour.
Useful load	150 tons per hour.

Winding 6 full days for the full mill time of 7 days, gives 128 tons average per hour for full mill time, which at 5 tons per stamp gives:

2 shifts of	8 hours each	2,048 tons 409 stamps.
2 shifts of	10 hours each	2,560 tons 512 stamps.
3 shifts of	8 hours each	3,072 tons 614 stamps.

But the above estimates are for a mill running full time, that is, every day in the week or month; taking an average of 28 days as the mill running time per month, the shaft capacity as compared with the mill capacity as given above is increased.

Turning now to labor, and it is in the handling of labor that stage-winding appeals particularly to the writer.

In 1878 on the Comstock Lode, Nevada, the Consolidated Virginia and California Mines were hauling through the C. & C. Shaft from the 1,850 and 1,950-ft. levels, working three shifts of 8 hours each with about 500 men per shift. The men were handled in three-deck cages through two compartments, 12 men on a deck or 36 men per cage.

At the Robinson Deep Mine in 1899, for two or three months prior to the war, they were handling 55 to 60 natives per trip at the No. 2 shaft from a depth of 1,900 ft. This was done by attaching three-deck cages under the skips when change-time came. At the present time they are hoisting and lowering their boys in three-deck cages, 14 men per deck, or 42 boys per trip. Owing to the scarcity of native labor there is no necessity to increase this number.

Bennett H. Brough, referring to the subject of winding men in a shaft 1,290 ft. deep, says* that careful experiments made by Mr. Stokes, H. M.'s inspector of Mines, showed that at one point in the shaft the men traveled at the rate of 37 miles per hour, which would be about 3,250 ft. per minute.

The writer had 528 full-grown mine boys and 72 pickanins weighed at the Simmer & Jack, with the following results, they were weighed in two batches and at different dates:

On October 23 317 boys weighed 42,163 lbs. or 133 lbs. each.

Thirty-six pickanins weighed 3,119 lbs. or 86 lbs. each.

On October 28 211 full-grown boys weighed 27,774 lbs., or 131.63 lbs. each, and 36 pickanins weighed 3,044 lbs., or 84.55 lbs. each. A summary of the two weighings is as follows:

528 full-grown boys weighed 69,937 lbs.—132.44 lbs. each.
72 pickanins weighed 6,163 lbs.—85.59 lbs. each.
The maximum weight of any boy was 177 lbs.
The minimum weight of any boy was 103 lbs.
The maximum weight of any pickanin was 100 lbs.
The minimum weight of any pickanin was 72 lbs.

Now, assuming a four-deck cage holding 48 men, and a rope speed of 2,000 ft. maximum per minute, making 20 trips per hour for the two compartments, we would have $48 \times 20 = 960$ men per hour for two compartments, say, 1,000 men, as probably at least one extra trip would be made in this time. If during change-time the hoisting of rock was suspended, and four-deck cages replaced the skips, four compartments would handle 2,000 men in the hour, and in case of a seven-compartment shaft, this could be increased to 3,000 men, or 6,000 men for two shifts.

The law requires a factor of safety of not lower than six. Mr. Behr has taken a factor of safety of at least seven for his ropes for hoisting both rock and men. This allows the use of all the shaft compartments when change-time comes, for hoisting men.

Mr. Jennings states that the first consideration to be taken into account is the safety of the men, and he estimates that to run 400 stamps it would require eight hours to handle his labor in the shafts. This would be lengthened to, say, 12 hours for 600 stamps.

Mr. Robeson also says: "It is necessary when speed in hoisting and maximum safety to men is concerned, to keep the two services separate, never hauling men on the skips which haul ore, and vice versa."

Particular stress is laid on the safety of the men. Yet these gentlemen propose that the laborers required to supply ore to 600 stamps shall spend 12 hours out of the 24 in traveling up and down a 5,000 or 6,000-ft. shaft, while heavy hauling is taking place in the adjoining compartments, when the breaking away of a skip in one of these might cause death to all those who happened to be in the manway. The only safe and effective method, in my opinion, is to suspend hauling rock and lower the miners as quickly as possible. When not handling men, two compartments out of the seven would always be reserved for incidental traveling in the shaft and the handling of material. I do not believe it possible to run 400 or 600 stamps under the conditions of handling labor proposed by Mr. Jennings and Mr. Robeson, not only on account of length of time required for shaft travel, being confined as they are to two compartments, but because any derangement in operating the engine or either compartment would seriously affect the working of the whole mine.

If the assumptions just given as to the handling of men and rock are approximately correct, one can estimate on supplying 600 stamps through four compartments with 4-ton net loads in two 8-hour shifts, and the labor for a 600-stamp mill could be easily and rapidly handled.

* "Mining at Great Depths," *Journal* of the Society of Arts, Dec. 11, 1896, p. 63.

THE AMERICAN CEMENT TRADE.

By CHARLES C. SCHNATTERBECK.

The growth of the cement trade in this country during the last decade has been phenomenal, chiefly by reason of the demand created by the extraordinary increase in the erection of high office buildings and also large submarine constructions. These enormous operations have increased the consumption of cement in the United States 167 per cent, or from 11,573,451 bbl. (of 300 lbs.) in 1893 to 30,853,606 bbl. in 1902. Simultaneously there has been rapid development in the domestic cement manufacturing industry, assisted by the employment of labor-saving devices. Not only has this progress been noted in the hydraulic and portland cement branches of the industry, but there has been also an advance in the manufacture of blast furnace slag cement, which until 1896 had received little or no attention. It is gratifying to remark that the quality of our cements are being steadily improved, as shown by tests and analyses, and in many instances they are now preferred to the foreign. The production of all kinds of cement in 1893 amounted to 8,119,939 bbl., and in 1902 to 28,691,738 bbl., showing an increase of 256 per cent in ten years. Such a large production has disconcerted importers, who must pay a duty of 8c. per 100 lbs., and also compete with the low prices quoted by Americans. Consequently, imports have fallen from 3,565,932 bbl. in 1893 to 2,659,720 bbl. in 1902, or about 25 per cent. On the other hand, we have built up an export trade, principally with the West Indies and South America, which is likely to grow when our production is sufficiently large to meet the demand. The exports in 1902 were approximately 497,886 bbl. of both foreign and domestic cement, while in 1893 the total was 112,520 bbl., showing an increase last year of 342½ per cent, principally in American portland cement.

The development of the American cement trade in the ten years from 1893 to 1902, is shown clearly in the table below, the figures being in barrels of 300 lbs.:

Year.	Production.	Imports.	Exports.	Consump.
1893	8,119,939	3,565,932	112,520	11,573,451
1894	8,633,455	3,517,476	120,966	12,029,965
1895	8,692,798	3,996,527	11,927	12,676,798
1896	8,693,796	3,556,902	54,639	12,195,959
1897	11,185,110	2,787,766	79,583	13,893,293
1898	13,150,742	2,685,092	70,892	15,764,942
1899	17,753,608	2,810,951	147,029	20,417,530
1900	20,486,274	3,182,245	186,586	23,481,933
1901	20,068,738	1,252,446	551,294	20,769,890
1902	28,691,738	2,659,720	497,886	30,853,606

By far the larger part of the production is in portland cement, which comes principally from Pennsylvania, New Jersey and Michigan, though in recent years there has been a large output from New York, Ohio, California and a few other States. This grade of cement has suffered severely from competition, and its market value has fallen fully 30 per cent in the past ten years. Natural hydraulic cement holds second place as regards quantity of output, the chief producing States being New York (particularly Ulster County), Pennsylvania, Indiana, Kentucky, Wisconsin, Illinois and Maryland. The selling price of this cement has also declined heavily, nearly in the same ratio as portland cement. A comparatively new industry is the manufacture of slag cement, which is carried on by six or seven concerns in Illinois, Maryland and Alabama, where there are large blast furnaces. In 1902 the output of slag cement was 139,495 metric tons, having an

average value, at works, of $7.89 per ton. Recently, the Illinois Steel Company, with works at Chicago and Joliet, and one of the principal steel manufacturers, took a contract for 65,000 bbl. (of 400 lbs.) of slag cement to be delivered in sacks at the Duluth-Superior harbor at $115,050, which was the lowest bid. This would average $8.85 per short ton, delivered.

Several attempts have been made to centralize control in the cement industry, such as have been tried with varied success in Europe, and although there have been some consolidations, no one concern is yet in full power. Good earnings are reported by the more important mills, and substantial dividends are being paid to the stockholders.

Our import trade has been carried on chiefly with Germany and Belgium, though Great Britain was also at one time an important factor. Competition with Americans and the import duty has reduced the price of foreign cement fully 25 per cent in the past ten years. This fact, coupled with the depression in the building trades abroad, has lowered the profits of European manufacturers to a level where it is necessary to greatly reduce the dividends usually paid to stockholders. At last accounts the German works were suffering keenly from this condition of affairs, while in Great Britain every nerve is being strained to prevent a dissolution of the consolidation.

The American cement industry, on the other hand, is prospering, and is now worthy to be ranked among the important branches of the great mineral industry.

MINING INVESTMENTS IN THE TRANSVAAL.

The mining companies of the Transvaal, excluding investment and land corporations, represent an investment of 200 millions sterling or about a billion dollars. This is approximately equal to the cost of the Boer war. The number, nominal capital and market valuation of the various companies is as follows:

Description.	Number.	Nom. Capital.	Market Val'n.
Mining	301	$460,440,000	$979,090,000
Investment	36	124,000,000	495,000,000
Land	13	38,550,000	90,000,000
Totals	350	$622,990,000	$1,564,090,000

The total investment in all kinds of mining and financial incorporations represents, at the market value, one billion and a half.

TIN: PRODUCTION AND CONSUMPTION.

In our number for January 3 last some estimates of the production and consumption of tin last year were given. We have now complete figures for the year 1902, so far as they can be obtained. As we said, in the article referred to, the production of tin is almost entirely in countries where no accurate figures can be obtained, or are kept in any form, and estimates must be based entirely upon the commercial statistics of exports, imports and the like. The estimates given below have been compiled with the aid of the official statements of exports and imports of the United States and Great Britain, and the trade circulars of Messrs. Sargant & Co., of London, and Ricard & Freiwald, of Amsterdam.

The production of tin in the world may be given as follows, in long tons, of 2,240 lbs.:

	1901.	1902.	Changes.	%
Straits	52,580	53,615	I. 1,035	2.0
Australia	3,345	3,199	D. 146	4.4
Banka and Billiton	19,365	18,765	D. 600	3.1
Bolivia	8,800	9,600	I. 800	8.1
Cornwall	4,125	3,950	D. 175	4.3
Other countries	500	550	I. 50	10.0
Total	88,715	89,679	I. 964	1.1

Straits tin—under which head is included all the tin mined in the Malay Peninsula—is the more important part of the supply, amounting to 59.8 per cent of the total last year. Moreover, it is the only production, except that of Bolivia, which shows any considerable increase. We are especially interested in this fact, in this country, since more than four-fifths of the tin imported into the United States is Straits tin. A total gain of less than a thousand tons in the world's supply is not at all a satisfactory showing.

In addition to the quantity shown above, there is a considerable production of tin in China, which has been estimated as high as 20,000 tons yearly, and is probably in excess of 10,000 tons. As there is no way of ascertaining the amount of this item, and, the figures given are entirely conjectural, this production has been omitted from the table. As the Chinese tin is usually consumed in the country, it has no effect on the trade or its statistics. Last year, however, some Yun-nan tin from China was offered in the London market; and it is possible that more will be exported hereafter.

The consumption of tin, which must necessarily be based on the attainable statistics of exports, imports and sales, may be given as below, in long tons:

	1901.	1902.	Changes.	%
United States	33,286	37,966	I. 4,680	14.2
Great Britain	19,061	16,673	D. 2,388	12.6
European Continent	23,613	23,809	I. 196	0.8
Japan, China and India	7,155	7,250	I. 95	1.3
Other countries	2,650	2,800	I. 150	5.7
Total	85,765	88,498	I. 2,733	3.2

No account has been taken in these estimates of the public, or known stocks, chiefly because there was no great change in the quantity reported at the close of 1902, from that at the end of 1901. The quantity credited to China is only that imported; the consumption is undoubtedly very much larger, but the native tin consumed is not included in the table, for the reasons given under production.

It will be seen that in 1902 the margin between production and consumption was very small. In fact, the output of tin is so very slightly in excess of the demand that the metal has assumed a highly speculative position. It is possible to influence the markets by the control of a comparatively small part of the production or the stocks. Advantage has been taken of this condition, in London and Amsterdam chiefly, and the fluctuations in prices of the metal have been frequent. No new producer of any importance has come forward for a considerable time, and it is very desirable, for the sake of the consumers, that new sources of supply should be found. The value of the new discoveries in Alaska is still uncertain, and the operation of mines, in the region where those discoveries are reported, would be difficult and expensive, owing to the rigorous climate and short working season. The reports of discoveries in the Philippines have not been, as yet, substantiated by intelligent exploration.

The United States consumes more tin than any other nation, having taken last year 42.9 per cent of the total quantity of the metal used. At present all this metal used in this country is imported, and the opening of new supplies in our own territory would be very desirable.

PIG IRON CONSUMPTION.

In the following table we show, in addition to the production, the imports, exports and approximate consumption of pig iron in the United States for two years past. The figures are in long tons:

	1901.	1902.	Changes.
Production	15,878,354	17,821,307	I. 1,942,951
Imports	62,930	625,383	I. 562,453
Total supplies	15,941,284	18,446,690	I. 2,505,406
Exports	81,211	27,487	D. 53,724
Approx. consumption	15,860,073	18,419,203	I. 2,559,130

In this statement the stocks on hand are not included, because these stocks have been, for two years past, very small, usually not exceeding a week's production; and they have shown no material changes.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

RIGHT TO SUE FOR PENALTY WHEN PARTY FAILS TO DRILL OIL-WELL.—Under a lease granting the exclusive right to drill for oil and gas, and to lay pipes for conducting it away, for five years, and as much longer as they could be found in paying quantities, the lessee agreeing to pay for same one-eighth of the oil produced, and $50 per annum for each paying gas well, and agreeing to commence drilling within a year, and in default thereof to pay 25 cents per acre per annum for the land, the court held that the lessor on default in drilling by the lessees did not have to wait till the end of the term for the 25 cents per acre, as that was payable annually; that though the lease was signed by the lessor only, yet he, having fully executed it, and it having been accepted by the lessees, and they having continued to hold it and to claim the right to exercise the privilege granted by it, it was binding on them.—Doxey's Estate v. Service (65 *Northeastern Reporter*, 757); Appellate Court of Indiana.

ABSTRACTS OF OFFICIAL REPORTS.

Santa Fe Gold and Copper Mining Company.

The report for the year ending December 31, 1902, as submitted at the recent annual meeting, shows receipts as follows: Cash, January 1, $146,038; sales of product, $56,798; miscellaneous, $20,123; total, $222,959. Expenditures were, at mine, $59,943; miscellaneous, $13,417; total, $73,360, leaving a balance on hand of $149,599.

President Susmann says: "It is with regret that the directors are obliged to report that during the year 1902 your property has been unproductive. The experience gained in the previous year made it evident that at the low price of copper ruling throughout the year, smelting operations could only be carried on at a considerable loss. It was deemed advisable, therefore, to confine the work during the first ten months of the year to the development of the principal ore-body and to prospecting for undiscovered deposits. During the year the mine has been put in excellent physical condition, and large additions have been made to the ore reserves. There are now about 40,000 tons of ore in sight.

"The prospecting work carried on during the year did not result so favorably, as no discoveries of any importance have been made. The property is now in charge of a caretaker, and every effort is being made to keep expenses to the lowest possible point. The future prosperity of the company depends principally, of course, upon the price of copper. The demand for copper has of late increased, and there is reason to believe that the price of the metal will soon reach a permanent higher level. In order to treat our ore economically and to reduce losses, it will be necessary to resort to some system of concentration. Before any steps are taken to change the present plant a series of experiments should be made with the ore to determine the best method of treating it. There is reason for hoping that the Santa Fe Railroad Company can be induced to build a spur to the mines. In fact, negotiations having this object in view were entered into, but were suspended on account of the depressed state of the copper market."

Mount Morgan Gold Mining Company, Queensland.

The latest report of this company covers the half year ending November 30, 1902. The profit and loss account shows receipts for the half year of £313,342, of which £312,910 were from bullion and the balance from miscellaneous. The total working expenses at the mine were £156,620. Royalties and taxes amounted to £7,254, making a total of £163,874, leaving net earnings of £149,468. There were paid from this in dividends £75,000, leaving a balance of £74,468. The balance brought forward from the previous half year was £78,995, making a total at the close of the year of £153,463 surplus on hand.

The total output of the mine was 119,026 tons of ore, of which 31,617 were classed as low grade oxidized, 26,370 as high-grade oxidized and 61,038 tons as sulphide ores. The oxidized ore was mined entirely by open cuts, most of it being taken from benches at 196 ft. and 252 ft. A new bench is now

being opened on the open cut, 286 ft. below the original top of the mountain. This carries the open cut down to the level of the ore-hoppers at the West Works, and to transport ore below this level to the works an inclined drive is being put down to reach approximately the bottom of the ore-body. In addition to the ore mined there were 53,980 tons of overburden removed. Besides the sulphide ore mined, 9,211 tons of worthless rock were sorted out, of which, however, 156 tons were high in sulphur and were used in making sulphuric acid. Development work included 931 ft. of driving and 743 ft. of rising and sinking in the underground works. No discovery of any considerable importance was made during the half year.

Reduction work was carried on satisfactorily and the quantity of ore treated, with the production of gold therefrom is given below:

	Ore, tons.	Gold, oz.	Oz. per ton.
Oxidized ore	57,987	38,738	0.67
Sulphide ore	61,039	35,736	0.59
Total ore	119,026	74,474	0.63
Tailings, etc.	16,262	3,768	0.23
Total	135,288	78,242	0.58

The total gold yield was 78,242 oz., of which 74,474 oz. were from ore mined, 3,728 oz. from tailings, and 40 oz. from by-products. Very little copper was saved during the year, owing to want of water. The plant was cleaned up and 47 tons of copper-precipitate were shipped to England for realization.

During the half year the total rainfall amounted to only 1.34 in., which was an entirely insufficient supply. For a very large part of the year water was hauled by train to the mines, 28,280,100 gallons being brought in this way. This supply was assisted by water pumped from shafts in the vicinity of the mine, and by utilization of the water in the old shafts. At the close of the half year the smaller dams were full, but in the larger dam there was only a few feet of water. The rain, however, had just begun to fall and the probabilities were that a good supply would be secured to be fully operated for some months to come.

The director's report says that the increase in the credit balance enabled the board to carry out the policy announced at the last annual meeting, and to declare a special dividend of 2s. 6d. a share. This was applied to meet a call made for the same amount. The shares of the company are now fully paid up to £1, and the money received for calls will be invested on capital account. In addition to this dividend the sum of £75,000—7½ per cent—was paid in dividends during the half year.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

South Australia. Statistical Register. Compiled from Official Records. Adelaide, S. A.; Government Printer. Pages, 320.

O Mangancz no Brazil. By Herbert Kilburn Scott. Rio de Janeiro, Brazil; reprinted from the *Jornal do Commercio.* Pages, 58.

The Manufacture and Properties of Iron and Steel. By Harry Huse Campbell. New York and London; the ENGINEERING AND MINING JOURNAL. Pages, 896; illustrated. Price, $5.

United States Department of Agriculture. Report of the Forester for 1902. Gifford Pinchot, Forester. Washington; Government Printing Office. Pages, 28.

Engineering for Land Drainage. By Charles G. Elliott. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 240; illustrated. Price, $3.

Atlas of Designs Concerning Blast Furnace Practice. Compiled by Michael Parloff. Ekaterinoslav, Russia; published for the author. New York; the David Williams Company. Atlas, 127 plates, each 14 by 10½ ins. Price, $5.

Kalender fur Elektrochemiker, sowie Technische Chemiker und Physiker. Prepared by Dr. A. Newburger. Berlin, Germany; M. Krayn. Volume I, 584 pages; Volume II, 448 pages; illustrated. Price (in New York), $1.40.

The Journal of the Iron and Steel Institute. Volume LXII, No. II. 1902. Edited by Bennett H. Brough, Secretary. London, England; published for the Institute by E. & F. N. Spon, Limited. New York; Spon & Chamberlain. Pages, 648; illustrated.

BOOKS REVIEWED.

Guide to the Mineralogical Collection of the New York State Museum. By Herbert P. Whitlock. Being Bulletin 58, of the New York State Museum. Albany, N. Y.; published by the University of the State of New York. Pages, 148; illustrated. Price, 40 cents.

This volume describes the collections representing the mineralogy of New York State, which are preserved in the State Museum at Albany. Incidentally, it contains a great deal of information on mineralogy. It is introduced by a chapter on the general properties of the minerals and on crystallization, with definitions intended to make the succeeding sections clear. The descriptions are generally given in somewhat condensed form, but are easy to understand, and the engravings and diagrams very fully illustrate the different forms of crystals and their combinations. While it is a guide to the particular collection named, it may also be read with profit by almost any student of mineralogy.

Economics of Forestry. By Dr. Bernhard E. Fernow. New York; Thomas Y. Crowell & Co. Pages, 520. Price, $1.50, net.

Until a very recent date the science of forestry was entirely neglected in this country. The first settlers on the Atlantic seaboard found the country, almost everywhere, covered with a dense forest growth. Their first work was to clear sufficient land for cultivation. Their descendants seem to have inherited a general idea that the forest was something to be destroyed—that it was only necessary to get rid of the trees in the shortest possible time and the easiest way. It is only within a few years that we have begun to realize that our forest resources have been recklessly wasted, and that we have begun to take some measures to preserve what is left, and to replace where possible that which has been destroyed. Much of this realization has been due to the labors of Dr. Fernow, formerly as Chief of the Division of Forestry in the Department of Agriculture, and more recently as director of the New York State College of Forestry, at Cornell University.

In the present volume forests and forestry are treated from an economic standpoint. It shows the value of the forest in connection with agricultural and commercial interests; its usefulness in connection with water supply and climatic conditions; and its importance as a crop or product of the ground. While the economic side of the question is that mainly considered, some consideration of forestry as a science is included as necessary, and an outline is given of forest policies abroad, and in the United States—so far as any policy can be said to have been adopted here. The great importance of the subject is well shown.

Dr. Fernow has made an excellent book. which ought to be widely read. It is, indeed, the only book we know in the English language, which treats the subject comprehensively.

The Diamond Mines of South Africa. Some Account of Their Rise and Development. By Gardner F. Williams. New York; The Macmillan Company. London; Macmillan & Co., Limited. Pages, 700; with maps and many illustrations. Price, $10.

This elaborate work is, in the main, a history of the discovery of diamonds in South Africa, of the opening of the mines, and of the subsequent consolidation of the industry under the control of the De Beers Consolidated Mines, Limited, now the richest company in the world, devoted exclusively to mining. In addition to this history there is much of general interest, for the introductory chapter, covering 31 pages, gives a general account of the use of gems from the earliest times; the demand for them and the high value put upon them by different nations, more or less civilized; and the special rank which the diamond has held among precious stones almost from the earliest historic times. Incidentally, there is some account of the famous diamonds of the world, most of which have long and varied histories, like the Koh-i-noor, to the ownership of which Indian tradition attaches the rulership of the country, the Pitt, the Regent, the Sancy, the Orloff and other noted stones. Most of these famous diamonds came originally from India, where this gem seems first to have attained its pre-eminence. It is a remarkable fact that in the country which furnished so many of these stones in early times the diamond mining industry has now fallen to insignificant proportions. Not long after the discovery of America the diamond mines of Brazil began to take the place of the Indian mines; and they continued to be the main source of the world's supply for centuries. In their turn they have been almost abandoned, at the present time supplying little more than the black diamonds, or bort, used for drills and for some other manufacturing purposes. South Africa now holds the diamond market, and seems likely to hold it for a long time to come.

While the diamond has certain properties possessed by no other mineral, the great value attached to it, by so many nations and for so many centuries, constitutes one of those problems in human life and history which are impossible of solution. In India, from the earliest historic times it has been not only a symbol of power and wealth, but a Hindu diamond has often been part of a Hindu religion. It seems quite probable that the European valuation of the gem was, in part at least, derived from the country where the first great diamonds were found.

Following this general introduction is a chapter on the early history of South Africa, and its wealth in gold and diamonds, which was known or surmised from very early times. The voyages and explorations of the Arabs and of the unknown people who have left their mark in the ruined cities and ancient mines of Mashonaland, are but dimly known to us through a mist of tradition. The Portuguese and Dutch navigators, who made the first known discoveries in South Africa, found very little treasure, and it was not until three centuries and a half after the Portuguese had landed in the Zambesi country, and over two centuries after the Dutch had established a colony at the Cape of Good Hope, that the mineral wealth of the country began to be known.

Passing from tradition and early history to the later and well-known facts, the book describes in successive chapters the gradual advance of the Boer colonists from the Cape to the Vaal and Orange rivers and beyond them into the High Veldt; the first discovery of diamonds on the banks of the Vaal River in 1867, the importance of which was not fully realized for some time; and the rush of diamond seekers into the country. For a long time the work was confined to the alluvial ground along the rivers, and the discovery of the diamond deposits at Kimberley, at Bultfontein, Jagersfontein and elsewhere did not come till later. The earlier mining at Kimberley by individuals and small companies is described at length; and we are told of the gradual consolidation of interests in the hands of larger companies, and lastly of the absorption of the whole field by the De Beers Company. This final combina-

tion was mainly the work of Cecil Rhodes, aided by Alfred Beit and Barney Barnato, and backed largely by the capital of the Rothschilds. Over 300 pages are occupied by the historical account.

A large space—220 pages more—is given to accounts of the nature of the diamond-bearing deposits; the methods of mining; the treatment of the "blue ground," in which the gems are found; the difficulties encountered in mining; the white and native labor employed and the special conditions relating to the negro forces; and to the gradual development of the machinery and processes used. This part of the book is of special interest to the mining engineer, while it is not severely technical, but is so written as to make it interesting to the general reader.

Following the mining section there are chapters on the diamond market; on the cutting and polishing of gems, putting them in condition for sale and for use in jewelry. Concluding, the main part of the book is a chapter tracing the effect of the diamond mines on the history and development of South Africa. The discovery of diamonds, followed by that of gold in the Transvaal, built up the railroad system of the country, drew colonists, and established cities in a region which had been apparently destined to remain a sparsely settled pastoral country. This growth made possible the still further advance into Rhodesia and the project of the "Cape-to-Cairo" railroad, which is now in a fair way to be realized before many years. The diamond came first; gold, coal and lately copper followed, and the railroad became a necessity. Instead of a few Boer herdsman a large and composite white population has been brought in, and employment has been given to many thousands of the negroes. In fact, one problem of the management is to get and keep enough native labor to carry out its plans.

In an appendix covering 70 pages we have first an account of the siege of Kimberley during the Boer war; really the most striking incident of that war, owing to the stubborn persistence of the besieging force and the equally stubborn resistance of the besieged, most of whom were the civilian workmen of the mines. Then there are descriptions of the latest hoisting and pumping plants installed at the Kimberley Mines; and lastly, condensed statistics of operations of the De Beers Company. The extent of these can be realized from the fact that in the last year given in the tables the company realized, in round figures, $22,850,000 from the sale of diamonds and paid $7,900,000 in dividends.

The book is profusely illustrated. In the historical section some rare prints and maps are reproduced. The descriptive part contains many photographs and drawings, showing machinery and mining methods. There is also a great variety of views of general interest, together with many portraits, and illustrations of South African scenery. The book is well printed, on heavy paper, and is, mechanically speaking, an excellent specimen of bookwork.

Some engineers might wish for a more strictly technical work. Such a volume, however, would have been only for the professional reader. The book as written is for the general reader, while it includes much technical information also. As a monograph of an elaborate and almost sumptuous kind on a special and very interesting branch of mining it stands alone—and is valuable.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Heap Coking of Coal.

Sir.—It may be interesting to you to know that in Southwest Virginia a return has been made—for the time at least—to the old practice of heap-coking.

The coke manufacturers of this and near-by districts having orders far beyond the capacity of their ovens, Mr. E. L. Harper, president of the Big Stone Gap Iron Company, at Big Stone Gap, Va., arrived at the furnace from New York, January 20, and prepared the first heap or kiln of coal to coke on the ground, and had the same fired within four hours after his arrival. They are now producing a large quantity of very superior coke, analysis as follows: Volatile matter, 2.17; ash, 5.90; fixed carbon, 91.93; sulphur, 0.85.

If other furnaces would follow the example it would soon relieve the present situation very much.

VIRGINIA.

Big Stone Gap, Va., Jan. 27, 1903.

Mechanical Feeding of Silver-Lead Furnaces.

Sir.—Referring to the article by Mr. A. S. Dwight, on "Mechanical Feeding of Silver Lead Furnaces," I wish to say that in all important points relating to the actual success of feeding in this manner I agree with his conclusions, and indorse his arguments as sound.

He has, however, lost himself in his argument, doubled on his trail and attached his name to the Dwight curtain and spreader. The curtain is, in fact, the Pfort curtain, which Mr. Dwight condemns in the first part of his paper read before the Institute of Mining Engineers, and which he acknowledges was abandoned in the "Final Form" of the East Helena feeder. The spreader is also plainly shown in the section of the Pueblo car, as well as the East Helena car. In the case of the East Helena car the spreader was too narrow and the bottom doors too wide, which made it ineffective.

There is no virtue in renaming things. The difficulty is to develop a new and sweeter rose.

In the field of matte smelting, where there is an excess of sulphur to be burned off, the conditions which are undesirable in lead smelting become desirable. The coarse material should be fed to the furnace wall and the fines to the center, to avoid reduction and promote oxidation, and thereby increase the grade of the matte.

HIRAM W. HIXON.

Victoria Mines, Ont., Feb. 4, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Antimony Ores.—Who are the buyers of high-grade antimony ores in this country? For what purposes is the ore used?—J. E. B.

Answer.—Antimony ores are smelted to obtain the metallic antimony. The only smelters of such ores in the United States at present are Mathison & Co., whose works are on Staten Island, New York.

Coal in Great Britain and the United States.—Did not the coal production of Great Britain in 1902 exceed that of the United States—as it did a few years ago?—F. L.

Answer.—The United States remained the leading coal producer last year. A shortage of over 20,000,000 tons in anthracite last year was made up by the increased output of bituminous coal. The estimate of total coal production in 1902, as given in our issue of January 3, was 293,300,000 short tons. The estimate for British coal output for the year, as given by the London *Iron and Coal Trades Review*, is 221,000,000 long tons, equal to 247,520,000 short tons; that is, about 46,000,000 tons less than the United States.

Uranium Ore.—We have a large supply of uranium ore, running from 6 per cent up. Who handles this ore? We know at present of no way of getting this ore on the market.—L. C. R.

Answer.—The demand for uranium ore is not large. The production and sales in this country are not over 200 tons a year. The ore is bought on assay entirely, and no general price can be given. The principal buyers are Poullot & Voillegue, of Cashin, Colo. There are several buyers in Germany, but they will not take ores on American assays, paying only on the assays made after the ores are received at their works.

THE MANHES CONVERTER PATENT.

In the case of Franklin Farrel and others against the United Verde Copper Company, a decision was filed in the United States Circuit Court, Southern District of New York, on January 16. The suit was brought to restrain infringement of two patents, Nos. 456,516 and 470,644, issued to Pierre Manhes, of Lyons, France, covering certain improvements in what is known as the Manhes converter. At the hearing the first patent, No. 456,516, was abandoned by the complainants and withdrawn from the consideration of the Court, as its term had expired before the commencement of the suit. The case therefore rested on the second patent, which contains two claims, each of which was in controversy. This patent was issued March 8, 1892, the application having been filed in 1885, and the improvement to which it relates had already been patented in Great Britain in 1883. The first claim relates to the methods of clearing and insuring uniformity in the blast in converters, which consists in driving into and through the tuyere holes a bar for removing the chilled copper around the inner end of the tuyere. It appears that the claim was rejected originally by the Patent Office on the ground that practice of clearing ore by barring was an old one, being constantly used in blast furnaces. It was claimed, however, on the part of the patentee that the method was new and patentable as applied to the copper converter. The two claims of the patent as finally issued were as follows:

"1. The process of reducing commercial or pig copper from copper matte, consisting in changing the matte in a molten state into a converter, forcing radial jets of air uniformly and continuously through the charge of molten matte and causing the heat produced by the combustion of the sulphur and iron in the matte to separate the foreign substance from the metallic copper contained therein, allowing the metallic copper as it is separated from the matte to settle below the action of the air-jets and removing the chilled metallic copper as it forms around and obstructs the inner ends of the tuyeres, and thereby insure the maintenance of a continuous and practically uniform distribution of air throughout the molten matte, and continuing the operation until the metallic copper contained in the charge has been separated therefrom and then removing the copper from the converter, substantially as set forth.

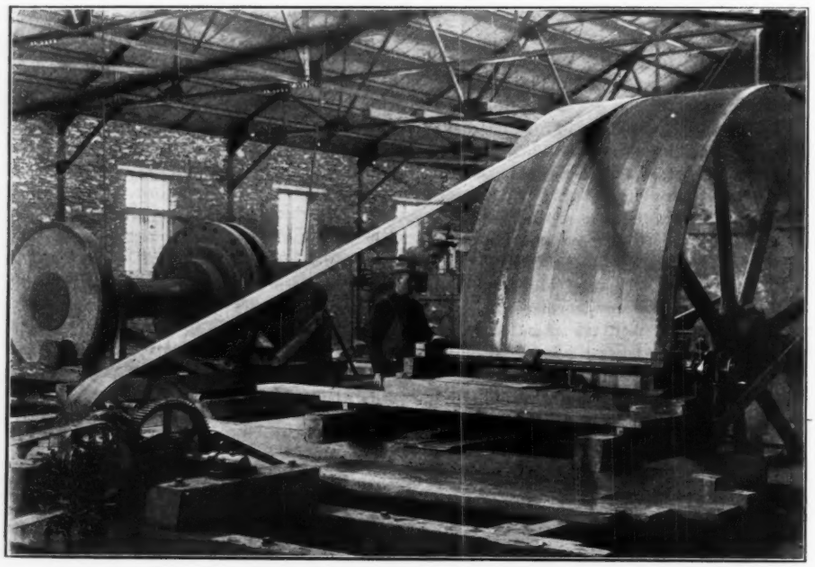
"2. A converter for reducing commercial or pig copper from copper matte, having a wind-belt encircling the converter above its bottom, a series of tuyeres extending through the lining of the converter and communicating at their outer ends with the wind-belt, and removable stoppers located in the outer wall of the wind-belt and in alignment with each one of said tuyeres, whereby a drift-bar may be inserted successively through said tuyeres to remove obstructions from their inner ends, substantially as set forth."

In the final decision just rendered Judge Wallace considered these claims in succession, and with reference to the patent previously granted in the United States and Great Britain, and finally comes to the conclusion that, however much the patentee may have contributed by his other inventions to the improvement of the art of smelting copper, those which are subject of the present patent seem so destitute of merit as to excite surprise at the action of the Patent Office in finally allowing this application. The bill for an injunction against the alleged infringement is therefore dismissed.

REMOVING A POWER PLANT.

It often becomes necessary to remove, to enlarge, or to increase the machinery in a plant, and in some cases to transfer to other places a part or all the old machinery in moving to newer buildings, etc. In this way valuable material is often consigned to the scrap heap simply because the owners could see no practical way of utilizing the material under the new conditions. Therein a great mistake is often made. What was impossible and improbable a few years ago is to-day, under the hands of the mechanic skilled in such work, but a question of opportunity, to enable him to succeed in placing seemingly worthless scrap on a par with the newest pieces of machinery in the shop. Hence, it is always well when making changes to consult some one who is familiar with making such changes. The added expenses will be nothing compared to the saving obtained by expert advice.

The accompanying illustration shows an instance where a very considerable saving was effected through the advice of a skilled mechanical engineer. About twelve years ago the American Cement Company erected a plant at Jordan, N. Y., the motive power being furnished by a Corliss engine 24 by 48 in. cylinder. Power was applied from the engine shaft to two line shafts by the use of two double belts 36 ins. wide. The driving wheels were, respectively, 15 ft. diameter and 37½ ins. face, and 15 ft. 0⅜ in. diameter, with the same face. The factory was abandoned about three years ago, but recently the company erected new works at Egypt, Pa., and the engine from the old factory was to be moved there. The idea of using the two large pulleys was abandoned, as from the arrangement of the new mill, they would have to be placed side by side, furnishing power to one line shaft with a much wider belt. The slight difference of diameter seemed to make this impossible. The removal of the machinery and its installation in the new works was placed in charge of John T. Lindstrom, of Allentown, Pa. It appeared to him that the use of the two condemned wheels was entirely possible. The engine itself was taken down and transported from Jordan to Egypt in the short space of 12 days. After the engine had been erected on the new foundation the work of placing the two large wheels on the shaft was begun. The first point was to get them securely fastened on the shaft. This was done by the use of four plates, 9 by 3 by 1 in., having two 1¼-in. holes drilled 6 ins. apart. Bolts, turned to fit, were securely screwed through these, to the rims of the wheels, thus insuring their rigidity. When it was completed a special arrangement for turning off the face of the wheels was made. Timbers 10 by 10 ins. were bolted together in crib form, and across the top of this frame was placed an ordinary boring bar, securely attached in two hardwood boxes at perfect square with the engine shaft, and then properly leveled. The feeding gear was then attached to the end of the bar and the feed-motion was taken from the engine eccentric, thus working automatically. At a distance of 20 ft. back from the bar, triple gears and a 36-in. pulley were erected. From the pulley a 10-in. belt was run around the wheel to be faced off. Power was applied to the triple gearing from a 4-in. belt, which ran back of a small 5 horse-power auxiliary engine. After this arrangement was completed the tool was set and the wheel was started revolving, the rate of 42 ft. per minute being adopted. After the ⅜ in. was taken off the larger wheel, a cut was taken across the whole face of the two wheels—75 ins. After finishing this first cut the taper on the crown was then easily turned; the surface was left flat for a distance of 18 ins. from the center, and from that point the crown was carried on either side to the edge. The job was completed without any trouble, and the two wheels answer the purpose quite as well as a new one, the whole cost being not very much in excess of what the freight and cartage of a new wheel would have been.



RE-FACING DRIVING PULLEY IN PLACE.

On the photograph a 32 by 48-in. engine can be seen in process of erection in the background. The shaft is shown upon skids preparatory to being placed in position. Mr. Lindstrom, who had charge of this work, is well equipped for an arrangement of this kind, and from long experience was thus able to effect a considerable saving

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

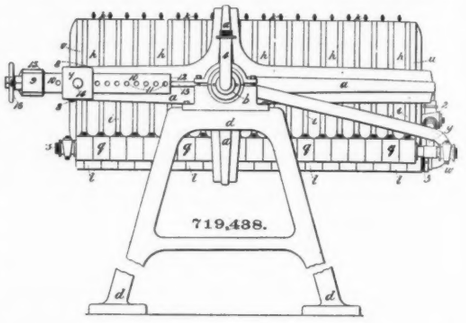
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 3, 1903.

719,415. PIGMENT AND PROCESS OF MAKING SAME.—William J. Armbruster, St. Louis, Mo. The process of making pigment consisting of mixing solutions of zinc sulphate, a carbonate of an alkali metal, and barium sulphide, and recovering the resulting precipitates.

719,429. TRANSIT.—George L. Buff, Jamaica Plain, Mass. In a transit, a vernier-plate having a spirit-level with an end overhanging the edge of said plate, but receiving its support directly therefrom, and a guard for protecting the overhanging end.

719,438. FILTER AND EXTRACTOR PRESS.—John G. Crossman, Watford, England. An improved filter and extractor press comprising a frame supporting the sectional filter, hollow trunnions upon which said frame is pivotally mounted, hollow press-frames forming the compartments of the filter and holding the material to be treated, corrugated intermediate partition-plates disposed between the press-frames and carrying filtering fabric on either side of the corrugated plates, annular bosses on the press-frames ex-

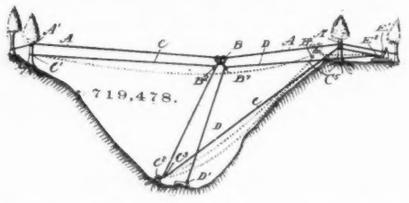


ternally of the filtering area of the intermediate plates, said bosses forming when the several press-frames and intermediate plates are closed together a continuous inlet-pipe for conveying the material to be treated to the compartments of the filter, two similar bosses on the intermediate plates forming when the parts are assembled continuous inlet and outlet pipes for the liquor to be treated, passages in one set of said bosses leading from one pipe to one side of the intermediate plate and passages leading from the other pipe to the other side of the intermediate filter-plate, connection from said liquor inlet and outlet pipes to one hollow trunnion and connections from the pipe formed by bosses of the compartment-frames leading to the other hollow trunnion, means for allowing the plates and frame of the filter to be separated or assembled and means for securing them in position when assembled .

719,444. WELL-PIPE PULLER.—James A. De Vore, Macksville, Kan. A pipe or rod gripping device, comprising jaws reversely disposed on opposite sides of the pipe, lever-arms pivotally united centrally to said jaws, straps embracing opposite sides of said lever-arms below said jaws and pivotally connected thereto and reversely curved at their centers to encompass opposite sides of and form a guide to the pipe, links connecting said lever-arms above said jaws, means for flexibly coupling the upper ends of said links and means to forcefully move said lever-arms upwardly and inwardly.

719,454. COMPRESSOR.—William J. Francke, New Brunswick, N. J., assignor to the Brunswick Refrigerating Company, New Brunswick, N. J. In a compressor, the combination with a cylinder, a piston, a suction-valve, and a discharge-valve, of a chamber forming an oil-cushion behind the suction-valve, a chamber in front of the piston, a conduit to deliver oil from the chamber in front of the piston to the first-named chamber, and a conduit to receive the oil escaping from the first-named chamber, prevent its escape behind the piston and return it to the second-named chamber through the discharge-valve, whereby the oil in the first-named chamber is under the discharge pressure.

719,478. CABLEWAY SYSTEM.—Frank H. Lamb, Hoquiam, Wash. The combination of a way, a traveler mount-



ed thereon provided with a brake to engage the way, a haul back-block upon said traveler adapted to operate said brake, and a haul back-line extending through said block for operating the traveler when taut and setting said brake when slackened.

719,484. APPARATUS FOR ELECTROTHERMALLY TREATING MATERIALS.—Hudson Maxim, London, England. The combination of a crucible having a plurality of electrode ports or openings on one side thereof, and an opening opposite said ports, with a plurality of electrodes entering the crucible through said ports and means for simultaneously and progressively withdrawing said electrodes from the crucible.

719,488. METHOD OF CONVERTING COPPER MATTE INTO METALLIC COPPER.—George Mitchell, Naco, Ariz. A method of converting copper matte into metallic copper, which consists in feeding pure or practically pure silica in a molten condition into the molten matte during the operation of blowing.

719,507. ELECTRIC FURNACE.—Henry N. Potter, New Rochelle, N. Y., assignor to Geo. Westinghouse, Pittsburg, Pa. An electric furnace consisting of a tube composed of a

mixture of dry electrolytes, and provided with confronting electric-circuit terminals arranged in pairs at its opposite ends, each pair of terminals being in series with a separate ballast device.

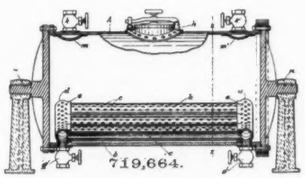
719,508. CLAMP DEVICE FOR ELECTRIC WELDING-MACHINES.—Adolph F. Rietzel, Lynn, Mass., assignor to Thomson Electric Welding Company, Lynn, Mass. The combination of a lever carrying a clamp-jaw, a vertically-adjustable support therefor, a threaded bolt connected to said support and an adjusting-nut.

719,567. DREDGING AND EXCAVATING MACHINE.—John J. Conlin, San Francisco, Cal. The combination with a movable platform, a dredging-wheel mounted thereon for rotation in an upright plane, of means for raising and lowering the platform, comprising fixed nuts in the platform on opposite sides of the axle, screw-rods working through the nuts, fixed bearings below the movable platform in which the lower ends of the screw-rods are fitted to rotate, power-driven shafts mounted on the platform and gears connecting the screw-rods with said shafts to rotate the rods in unison, and an adjustable counterbalance on the movable platform.

719,577. MINE-CAR-OPERATED DOOR.—Alonzo T. Flint and Isaac Whitney, Oskaloosa, Iowa. The combination of a mine-door composed of upper and lower sections, the upper section being hinged at the top and the lower section being mounted independently of the upper section and movable in the opposite direction, whereby the pressure of air on the door will be equalized, and means for connecting the sections to cause the same to move in unison and for actuating the said sections.

719,582. GOLD-SEPARATING APPARATUS FOR DREDGING-MACHINES.—James H. Gray, San Francisco, Cal. The combination with a revoluble cylindrical screen, of a plurality of aprons beneath the screen having inclination laterally outward in opposite directoins from a ridge situated longitudinally under the center of the screen, an equalizing-bar on the lower end of each of the aprons, an adjustable gate between the ridge and the bottom of the screen, and means for setting and holding the gate at varying angles in either direction from its central position.

719,664. CHLORINATION BARREL.—James B. Heffernan, Colorado Springs, Colo. In a chlorination-barrel a series of


719,664.

pipes having numerous perforations throughout their lengths, arranged in parallel and lying close to the inside wall of said barrel, and having suitable connections with an outside fluid-pressure system.

719,655. APPARATUS FOR MAKING HOLLOW ARTIFICIAL-STONE BLOCKS.—Secondo Giletti, San Francisco, Cal. The combination of a mold having openings in its opposite sides, and a contractible core comprising a hollow flexible casing having inseparable flanges or webs upon the inner surfaces of its walls, a longitudinal central support, links extending from the support to the flanges, and bolts passing through both the ends of the links and said flanges.

719,694. FEED MECHANISM FOR ROLLING-MILLS.—John J. Purcell, Allegheny, Pa., assignor to Lockhart Iron and Steel Company, McKees Rocks, Pa.—The combination of a rolling-mill and a feed mechanism constructed to grip and return the article to the front of the rolls in a horizantal plane at one side of the plane of bite of the rolls, and arranged to receive the article as it drops from between the rolls.

719,698. PROCESS OF PRODUCING ALUMINUM.—Heinrich F. D. Schwahn, St. Louis, Mo. A process of reducing an aluminum compound, which consists in subjecting such compound to the action of a reducing agent of which sulphur is a component, at a temperature sufficient to effect the reduction.

719,706. CINDER OR HOT-METAL CAR FOR BLAST-FURNACES.—Edgar A. Weimer, Lebanon, Pa. A cinder or other car having a ladle provided with a trunnion at each end, elongated seats or bearings on which said trunnions are supported, a toothed wheel on one of said trunnions and a revoluble member engaging said toothed wheel; in combination with a motor connected to said member to impart lateral and revoluble motion to the ladle.

719,722. BRICK-CUTTER.—Byron E. Bechtel, Waterloo, Canada. A rotary cutting-reel having radial diametrically-sliding arms provided with cutting devices.

719,725. PROCESS OF PULVERIZING METALS.—Camille Bertou, Paris, France. A process for the pulverization of readily-fusible metals, which consists in forcing the fused metal to flow under the action of a strong pressure exerted upon it, utilizing the elastic force of the fluid itself and forcing it to mingle with a current of elastic fluid under pressure with which it forms a jet, the sudden expansion of which causes the pulverization of the metal.

719,744. METHOD OF CASTING AND ARTICLE MADE THEREBY.—Clinton D. Cannon, Battle Creek, Mich., assignor of one-third to Corodon S. Cannon, Battle Creek, Mich. An improvement in the art of casting metallic articles which consists in first forming an outer metallic sheathing in sections and of the shape of the article to be cast, and casting a metallic body within the sheathing and in contact therewith.

719,756. MECHANISM FOR MIXING AND STORING LIQUIDS AND GASES FOR ORE TREATMENT.—Stanley C. C. Currie, New York, N. Y., assignor of one-half to William Courtenay, New York, N. Y. In combination, a water-tank, a caustic-alkali tank at a lower level than said water-tank and having pipe communicting with the water-tank, an alkali-stock tank at a still lower level than the caustic-alkali tank, and a pipe connecting the caustic-alkali tank and stock-tank, a mixing-chamber below said alkali-stock tank and a pipe connecting the two, and a by-pipe leading from the water-tank to the alkali-stock tank, all said pipes having controlling-cocks.

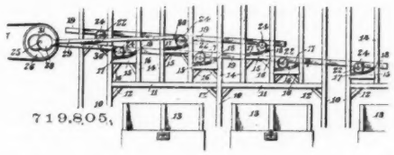
719,757. PROCESS OF TREATING ORES CONTAINING PRECIOUS METALS.—Stanley C. C. Currie, New York, N. Y., assignor of one-half to William Courtenay, New York, N. Y. A method of utilizing the heat of ores containing precious metals, which consists in passing the pulverized ore through a heated conduit, then plunging it into a bath containing water, thereby developing steam, and utilizing the steam so developed as an agent in the treatment of other quantities of ore.

719,766. MACHINE FOR SCREWING OR UNSCREWING WELL-CASING SECTIONS.—William H. Downing, Parkersburg, W. Va. In a machine for screwing and unscrewing well-casing sections the combination, with suitable driving-power, and a sprocket-wheel slidable on the power-shaft, of a split sprocket clamping-wheel, a screw-shaft having a gear-wheel, a clamping-nut for the screw-shaft, a vertically-slidable sprocket-wheel having a pinion meshing with said gear-wheel, and a sprocket-chain to operate the sprocket-wheels.

719,791. ELECTROLYTIC CELL.—Robert Grisson, Hamburg, Germany. In a transforming or condensing cell, electrodes therein, and a suitable electrolyte, one of said electrodes of aluminum and having substantially no vertically-disposed active surfaces.

719,804. MACHINERY FOR CRUSHING OR GRINDING ORE, ROCK, CEMENT, ETC.—David Honeywood, London, England. The combination of two horizontally-reciprocating heads or stamps, moving toward and from each other, a fixed driving-cylinder for one of the heads or stamps, a fixed compression-cylinder, driving and compression cylinders for the other stamp, adjustable toward and from the driving and compression cylinders of the head first mentioned, pistons in the compression and driving cylinders and adjustable lever and link connections between the pistons of the compression-cylinders.

719,805. SHAKING SCREEN.—George S. Ingle, Indianapolis, Ind. The combination with a pair of screens, of tracks arranged contiguous to each screen, said tracks each comprising sections, one section being disposed at an inclination to the other, supporting devices for the screens


719,805.

mounted upon the tracks, and means for simultaneously reciprocating the screens in opposite directions, the supporting devices of one screen being arranged to move over the inclined sections of their respective tracks when the supporting devices of the other screen are upon the opposite track-section.

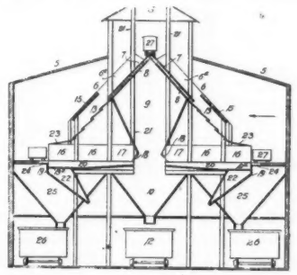
719,830. MANUFACTURE OF BRIQUETTES.—Edward S. Meade, Philadelphia, Pa., assignor to the North American Fuel Company, Camden, N. J., and Philadelphia, Pa. A briquette made of finely-divided lignite coal from which the moisture has been expelled by its sudden exposure to a relatively high temperature, in combination with a binder, the surface of the particles of said coal being roughened.

719,844. ACID-CHAMBER FOR SULPHITE-WORKS.—William A. McKee, Hinckley, N. Y. An acid-chamber comprising a closed cylindrical vessel provided with a series of conical hoppers, and a revoluble shaft mounted within said vessel and provided with conical deflectors, means for creating a partial vacuum for the purpose of drawing acid gases through the said vessel, means for passing an alkaline liquid through said vessel in a direction opposite to that of the travel of said gases, and means of removing the heat generated chemically within said vessel.

719,870, 719,871, 719,872 and 719,873. ELECTROLYTIC APPARATUS.—Charles J. Reed, Philadelphia, Pa., assignor to the Security Investment Company. In an electrolytic apparatus, an electrode consisting of a substantially vertical conducting amalgamated plate or plate adapted to become amalgamated, provided with receptacles of inert material of various heights above its bottom, and having projections extending into the several receptacles in contact with the mercury therein.

719,882. METHOD OF SUBDIVIDING BLOCKS OR INGOTS OF CARBIDE.—Joseph Scales, Niagara Falls, N. Y., assignor to Union Carbide Company. A method of subdividing blocks or ingots of those carbides which react with water, which consists in drilling the block, simultaneously injecting water or steam into the cavity formed by the drill, and then breaking the block through said cavity.

719,942. APPARATUS FOR SCREENING, WASHING, AND ASSORTING ORES.—Frederick Hermann, Victor, Colo. The combination of a grizzly, a suitable screen located underneath the grizzly, the screen and grizzly being inclined in the same direction, a receptacle below the screen for receiving the dry screenings, an inclined device located



below the screen and provided with openings to allow the finer material washed from the ore to pass through the said device, the latter being located to receive the discharge from the grizzly, suitable means mounted above the said device for discharging water upon the ore as it passes downwardly thereon, and a receptacle located beneath the said device for receiving the wet material which passes therethrough, whereby the wet and dry screenings are separated from each other.

719,974. DOWNDRAFT CONTINUOUS BRICK-KILN.—Alfred Yates, Somerville, Mass. A brick-kiln having a series of chimneys without the outer wall, the outside subterranean main flues coacting with said chimneys, the series of chimneys situated within the inner wall, the inside subterranean main flue arranged to coact with said inside chimneys.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 8, 1903.

23,363 of 1901. CLEANING BLAST FURNACE GASES.—E. L. Pease, Darlington. Removing dust from blast furnace gases by introducing the gases at the periphery of a rotating drum, in which water is sprayed, so making a removable mud.

25,880 of 1901. CAUSTIC SODA MAKING.—J. T. A. Walker and J. T. Steele, London. Improved method of preparing lime to be used for causticizing soda, and recovering the carbonate of lime so produced.

26,166 of 1901. ZINC ORE TREATMENT.—F. Ellershausen and R. W. Western, London. Treating zinc ores with hydric ammonic sulphate and acting on the double sulphate thus formed, with ammonia and thus obtaining zinc hydride.

1,562 of 1902. FILTER-PRESS.—C. W. Thompson, London. A filter press working by suction with filter plates and cloths at the top, and the solid material removed from the bottom continuously without the process being stopped.

1,688 of 1902. ELECTROLYTIC ZINC PRODUCTION.—H. Paweck, Vienna, Austria. In electrolytically depositing zinc, adding borax to the electrolyte.

1,998 of 1902. MAGNESITE BRICK.—L. Williams, Stockton-on-Tees. An improved method of making magnesite bricks.

4,026 of 1902. REMOVING ARSENIC FROM PLATINUM.—Meister Lucius and Brüning, Hoechst on Main, Germany. Removing arsenic compounds deposited on platinum used in the contact process for making sulphuric acid, by treating the platinum with steam and gaseous sulphurous acid.

Week Ending January 15, 1903.

26,470 of 1901. REFINING IRON.—Syndicat de l'Acier Gerard, Paris. Improvements in process for using an electric current to help in refining iron in a special furnace.

3,344 of 1902. STEEL REFINING.—O. Thiel, Kaiserslautern, Germany. Improvements in inventor's continuous process for refining steel.

8,183 of 1902. HAMMER PULVERIZER.—T. Parker, London. Improvements in pulverizers using rotary pivoted hammers, with the object of causing the particles to rebound from the cases to the hammers again.

21,095 of 1902. COAL BREAKER.—P. B. Bradley, Hingham, Mass., U. S. A. Regulating the size of coal in coal-breakers without having to remove and replace the breakers.

23,252 of 1902. ROTARY SCREEN.—A. W. Robinson, Montreal, Canada. Improved methods of driving the rotary screen used in treating material brought up by placer mining dredges.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Henry E. Wood has returned to Denver.

Mr. George Troop was in New York City during the week.

Mr. Wythe Denby will return on February 15 to Snettesham, Alaska.

Mr. A. C. Beatty, of Denver, Colo., is in New York City at the present time.

Mr. Robert Bell, State mining engineer of Idaho, was in Salt Lake, Utah, last week.

Mr. Theodore L. Lammers is now in practice as mining engineer at Duluth, Minn.

Mr. W. H. Shockley, from London, is on his way to examine the quicksilver mines at Marfa, Texas.

Mr. G. K. Fischer is superintending the construction of the concentrator of the Cactus Mine at Frisco, Utah.

Mr. Frank Nicholson, of Joplin, Mo., left on February 7 for Mexico, to examine certain mines on the west coast.

Mr. William A. Heywood, superintendent of the Tennessee Copper Company's smelter works, is in New York City.

Mr. Frederic P. Dewey, the chemist and metallurgist of Washington, D. C., has been appointed assayer to the Mint Bureau.

Mr. A. A. Blow and Mr. Samuel Newhouse were both passengers on the *Oceanic* sailing from New York City on February 9.

Mr. J. F. Stultz, of Hermosillo, Mex., is at Campo Santo Nifio, Sonora, engaged on construction plans for the Yaqui Copper Company.

Mr. John A. Church has returned to New York City after an extended professional visit of inspection to Clifton and Tombstone, Ariz.

Mr. W. J. Johnston, president of the ENGIENERING AND MINING JOURNAL, is expected in New York City from San Francisco on February 16.

Messrs. David D. Erwin and F. A. Nims, of Muskegon, Mich., who hold large interests in the mines of Park City, Utah, have been visiting that camp.

Mr. Elias S. Gatch, of St. Louis, Mo., secretary of the Granby Consolidated Mining and Smelting Company, visited New York City early in the week.

Mr. W. E. Thorne has left San Francisco, Cal., for Forty-Mile Creek, Alaska, to take the management of the Big Bend Mining Company's property there.

Mr. H, W. Hardinge, who recently designed the new concentrator at the Greene Consolidated Mines, at Cananea, Mex., has been in New York City for a few days.

Mr. T. McGuigan is now manager of the American Boy mines in Slocan District, B. C., and will have headquarters at Sandon, B. C., instead of Spokane, Wash.

Mr. W. A. Knapp has tendered his resignation as manager of the Central Mining Company, at West Bay City, Mich., and is succeeded by Mr. George Waller.

Mr. Robert J. Coleman, of Salt Lake, Utah, is visiting New York City from Mexico. He returns immediately to Mexico City, where his address for some weeks will be the Hotel Jardin.

Mr. A. J. McMillan is managing director of the Le Roi Company, whose mines are at Rossland, B. C., and smelters at Northport, Wash., will make his permanent headquarters at Rossland.

Major A. B. Litchfield, lately manager of the San Bernardo Mine, near Telluride, Colo., sailed for Africa last week to take charge of the gold properties of the Ashanti Gold Fields Corporation.

Mr. Thomas L. Darby, mining engineer, now living at Denver, Colo., originated the idea of a drainage adit for Leadville. This was referred to in connection with another name in our issue of January 17.

Mr. David R. Williams, who recently resigned as superintendent of the Carisa Mine, near Tintic, Utah, has gone to Prescott, Ariz., to accept a similar place on the staff of a company for which he formerly worked.

Mr. C. E. Hart, for 5 years general manager of the John Jackson Mining Company, at Joplin, Mo., is to succeed Mr. William B. Fisher, resigned, as general manager for the American Zinc, Lead and Smelting Company.

Mr. T. B. Rennell has resigned as superintendent of the mill of the Colorado Portland Cement Works, near Florence, Colo., and will go to Philadelphia, Pa. Mr. A. Moore, manager of the Newton Cement Works, succeeds him.

Mr. P. M. McCree, superintendent of the Yankee Consolidated Mine at Tintic, Utah, recently tendered his resignation to give his attention to other matters. He is succeeded by Mr. J. P. Turner, formerly with the United States Company.

Mr. H. B. Sturtevant, at one time manager of the Pioneer Mine, near Ely, Minn., is to take charge of the Buffalo & Susquehanna Iron Company's properties near Hibbing, Minn. Mr. Sturtevant will also have charge at the Beaufort Mine, near Michigamme, Minn.

Mr. Ernest S. Green, for 18 years with the New York office of Castner, Curran & Bullitt, has been appointed New York manager for the Fairmont Coal Company and its allied interests. His late partner, Mr. Lemuel Burrows, Jr., will remain with Castner, Curran & Bullitt as their sole manager in the New York office.

Mr. B. F. Bush has been appointed general manager of the Atoka Coal and Mining Company, Osage Coal and Mining Company, Western Coal and Mining Company, Lexington Coal Mining Company, Rich Hill Coal Mining Company, vice Mr. R. M. McDowell, resigned. Mr. Bush is also appointed fuel agent of the Missouri Pacific Railroad Company and the St. Louis, Iron Mountain & Southern Railroad Company, with office at St. Louis, Mo.

Prof. William G. King, who recently accepted the chair of metallurgy at the Colorado State School of Mines at Golden, was born at Akron, O., March 24, 1854. He studied at Western Reserve University; took a course in chemistry at Cooper Institute, New York, and took a post-graduate course of 2 years in chemistry and metallurgy at the School of Mines of Columbia University. Prof. King has been teaching most of the time for 18 years, 6 years in New York City, 3 years as instructor in chemistry in the Case School of Applied Science, at Cleveland, O.; 2 years as professor of chemistry and metallurgy at the College of Montana, Deer Lodge, and for the past 2½ years he has been the professor of chemistry and metallurgy at the Montana State School of Mines at Butte. After leaving the college of Montana in 1895, Prof. King was employed by various smelters at Butte for 6 years, and a part of this time was in charge of the assay offices and was engaged in experimental and research work for the smelters.

OBITUARY.

William C. Freeman, vice-president of the Lackawanna Iron and Steel Company, of Buffalo, N. Y., died at his home in Cornwall, Pa., on February 7, aged 62 years.

SOCIETIES AND TECHNICAL SCHOOLS.

TECHNOLOGY CLUB OF NEW YORK.—The eighth annual dinner was held February 5 in the banquet hall of the University Club. Among the guests who were also speakers were Henry S. Pritchett, president of the Massachusetts Institute of Technology; Alexander C. Humphreys, of Stevens Institute of Technology; Edward H. Harriman, the Rev. W. C. Clifton Smith, F. A. Vanderlip, C. Dubois Pollock, Alexander Rice McKim, Henry D. Hibbard and Robert Starr Allyn.

The club is to have a building of its own, located somewhere between Twenty-third Street and Forty-second Street, and between Madison and Sixth avenues.

INDIANA ENGINEERING SOCIETY.—The recent annual convention closed at Indianapolis after a 3 days' session. The society has recently incorporated, and has an enrollment of nearly 100. W. D. Pence, of Purdue University, Lafayette, president of the Society, in his annual address spoke encouragingly of engineering education, and said many phases of advancing civilization were making greater and more exacting demands upon the engineer. Statistics show that during 1902 there were more than 15,000 engineering students in attendance at the 114 institutions of this country, where engineering courses are taught, and public appreciation of the engineering school system is growing steadily greater.

A more startling illustration of the movement toward self-improvement is to be seen in the enormous growth of correspondence school patronage. One of the best of these institutions now is said to have 500,000 students enrolled. While this training is not of the best, nevertheless it is having a far reaching influence, and has awakened the ambition of many young men who are now attending technical schools by reason of the foretaste procured from the correspondence schools.

L. R. Sackett, of Richmond, is the new president of the society, and Charles C. Brown, of Indianapolis, is secretary.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—At the regular monthly meeting at Pittsburg, Pa., on January 20, Pittsburg's transportation problems were discussed. Antes Snyder, chief engineer of the Pennsylvania Railroad Company presented a paper which covered the development of the railroad systems of the western section of Pennsylvania. The deepening of the Ohio River for the benefit of navigation at the expense of the National Government he said was unfair to the railroads for the reason that the public funds are drawn upon for the benefit of aiding the river transportation companies, while the railroads in order to improve their roads are compelled to expend millions of dollars of their own private funds. Capt. Rodgers upheld the river transportation companies. He said that river shipments can be made in less time than rail for any distance over 500 miles, while the cost is less than half. The meeting was unusually well attended, 116 members and visitors being present. Sixty-three candidates for membership were elected, which is the largest number ever admitted to membership at any one meeting. Owing to the varied lines of engineering work engaged in by the members of the association, it was decided to organize sections for mechanical engineering and designers and draughtsmen. The annual banquet of the society will be held at the Hotel Schenley on February 27.

NEW MEXICO SCHOOL OF MINES.—This school has recently been completely reorganized along business lines. Practical training is especially emphasized in all the branches of mining and metallurgical engineering, but much attention is now paid to the investigative phases of the mining sciences and arts.

A comprehensive system of fellowships and scholarships is planned for the express purpose of encouraging students to direct their work along broad lines. The system contemplates the establishment of 2 classes of fellowships and 2 classes of scholarships. The first include ordinary fellowships and traveling fellowships. The ordinary fellowships, 10 in number, are expected to yield annually a sum equivalent to about $300 each, to be bestowed upon students who wish to carry on special advanced study in the New Mexico School of Mines. The work must be of the nature of original investigation and must be conducted systematically through the year, under the immediate direction of some member of the faculty. Of the traveling fellowships there are to be 2 grades —one yielding the equivalent of about $500 each, and the other about $1,000 each, the last being denominated foreign traveling fellowships. Holders, after completing the regular prescribed work at the New Mexico School of Mines, are given opportunity of spending a year in visiting and studying the principal mining and metallurgical districts of the Old World. One of the conditions of award is that each holder shall, sometime during the year following his return, give a brief course of lectures in the school upon topics connected with his investigations and observations. The regulations governing the award of these fellowships will be given out later.

Three of the traveling fellowships of the grade first mentioned will possibly be made available during the coming year. One fellowship to each of the departments of mining, metallurgy and mineral deposits may be awarded by the committee of the board of trustees having this matter in charge. The holders of these fellowships are expected to continue systematically through the year their work of investigation at this institution, but are given opportunity to spend a considerable portion of their time in this and other States of the Rocky Mountains.

Among the States scholarships are 50, each yielding about $100 annually, open to students living in the United States. They are held for one year. These scholarships are assigned sometime during the first semester of each academic year. There is one scholarship for each State in the Union. The student from each State passing the best examination for entrance to the school, or to advanced standing, or furnishing evidence of best qualifications to carry on the work in the New Mexico School of Mines, is awarded the scholarship for that State. The application must be made in writing before May 1 of the academic year preceding that in which the scholarships are awarded, and accompanying the application should be a short statement of the candidate's previous training, and an indication of the course he wishes to pursue.

In case in any one year worthy candidates do not offer themselves from any one State, the board, at its option, may reserve such appointments, or award them to applicants from other States, preference being given to students who already hold college degrees, or present evidence of unusual attainments in mining studies.

The New Mexican scholarships are 40, each yielding $25 a year, open to students who are actually

residents of New Mexico. They are good for a year, and are bestowed at the beginning of each academie year. These scholarships are awarded to the 2 students from each county in New Mexico passing the best examinations for entrance, or for advanced admission to the school, or presenting the evidences of best qualifications for carrying on the work of the course selected. Examinations must be taken at the regular time or at the beginning of the academic year. As in the case of the states scholarships the New Mexican scholarships are bestowed as honors, as incentives to good work. Holders of scholarships are expected to proceed to a degree.

INDUSTRIAL NOTES.

The Pelton Water Wheel Company is reported to be figuring on considerable South African business.

The Lidgerwood Manufacturing Company, of New York City, has recently taken a big order for cableways for New South Wales.

The George V. Cresson Company, of Philadelphia, Pa., has taken a Mexican contract for power transmission machinery.

The Philadelphia Pneumatic Tool Company has taken contracts for pneumatic appliances to be installed in Mexican railroad shops and copper mines.

The Salt Lake branch of Fairbanks, Morse & Co., C. P. Mason manager, reports the sale of a 34-h.p. gasoline engine and hoisting works, complete for the Cactus Mine, near Milford, Utah.

The G. O. Bartlett & Snow Company, of Cleveland, O., is in receipt of a large order for fertilizing machinery from the West Rand Fertilizer Company, Krugersdorp, Transvaal, South Africa.

The Cleveland Automatic Stoker Company recently incorporated by Cleveland and Toledo, O., people to manufacture a new automatic stoker, will erect its plant in Toledo instead of Cleveland, as originally planned.

The American Pulley Company, of Philadelphia, Pa., is shipping its steel pulley specialties to W. A. Ryan & Co., Auckland, New Zealand. Orders have also been taken recently for export to England, France and Russia.

The Cleveland Pneumatic Tool Company, reports a large amount of new business and repeat orders from many old customers. The company is now located in its new plant at the corner of Hawthorne and Second avenues, Cleveland, O.

F. W. Braun & Co., of Los Angeles, Cal., who recently purchased the business of John Taylor & Co., of San Francisco, the old established dealers in assayers' supplies, have moved their San Francisco branch to a new large building, Nos. 18-20 Spear Street, one block from the ferry depot.

The Ingersoll-Sergeant Drill Company, through its Salt Lake agency, recently shipped a 20-drill compound duplex compressor to the Alaska-Treadwell gold mines. This machine will be operated by rope-drive from a Pelton waterwheel, and will furnish air to operate the drills, which are of the same make.

The Carnegie Steel Company, the American Steel Hoop Company and the American Bridge Company have arranged for a joint agency in Australia. Henry L. Jones will be general agent. He was formerly connected with the general sales department of the Carnegie Steel Company. His address is 14 Martin Place, Sydney, N. S. W.

The Chicago Pneumatic Tool Company has secured contracts through Heatly & Graham, of Calcutta, for pneumatic plants to be installed in the Bengal-Nagpur Railroad shops and in the Government dockyard at Bombay. Neilson Reid & Co.'s locomotive shops at Glasgow, Scotland, and the Steel Company, of Scotland's plant in the same city, are to be equipped with pneumatic tools made by the Chicago Company.

The Potosine Electric Company, of San Luis Potosi, Mex., successor to the San Luis Potosi Electric Light Company, lately placed a contract through the electrical engineering and contracting firm of Sanderson & Porter, of New York City, for a 400-h.p. plant. There will be 3 100-kw. generators to be direct-connected to horizontal tandem single-crank gas engines of 170 h.p. capacity each, to be operated on Loomis-Pettibone producer gas. The Westinghouse interests will build the machinery.

A. F. Dudgeon, of Ashland, Wis., has ordered of the M. Garland Company, Bay City, Mich., sawmill machinery, to be shipped to the Fred Robinson Lumber Company, Revelstoke, B. C. The order includes a Garland steam nigger, Kline log loader, 2 slashers, a combined gang and edger, twin engine steam feed, lumber assorter, transfers, carriers, etc. The M. Garland Company is shipping another carload of machinery, including an 8-ft. band mill and 24-ft. slab slasher, to Mack Dickinson & Co., Tower, Mich., and has another band mill and 2 Edgers about ready to ship. The shop is full of work, and business generally is very satisfactory.

Among recent shipments made by the American Concentrator Company, of Joplin, Mo., are 9 compartments New Century differential motion jigs to the Crystal Lead Mining Co., Isle, Colo.; 12 compartments New Century differential motion jigs to Idaho Springs Mining and Reduction Company, Idaho Springs, Colo.; 4 compartments New Century jigs to the Bismark-Nugget Gulch Consolidated Mining Company, Sheridan, Mont., a third order; 12 compartments New Century jigs to Gold Hunter Mining and Smelting Company, Mullan, Idaho; 14 compartments bituminous coal washing jigs to Dunbar, Pa.; 1 large anthracite coal jig to the Delaware and Hudson Company, Plymouth, Pa.

The Magnolia Metal Company has issued a prospectus offering $200,000 7 per cent preferred stock to the public. This issue is for the purpose of increasing the working capital and for business extension, and is caused by the large expansion of the company's business during the last year or two. The prospectus shows the net earnings of the company for the past five years to have been largely increased in excess of the amount required to pay the dividends on the 7 per cent preferred stock. The company, in addition to manufacturing Magnolia metal, Defender, Mystic and Kosmic, its specialties, is now producing every grade of babbitt metal, as well as linotype, stereotype, electrotype, casting metals, solder, etc., etc. It has offices and factories at New York, Chicago, San Francisco, New Orleans and Montreal, and branch offices in Pittsburg, Philadelphia and Boston.

Among the new orders booked by the Bradley Pulverizer Company, of Boston, Mass., during January for Griffin mills, have been the following: Penn Allen Portland Cement Company, Allentown, Pa.; entire grinding machinery for its new works; Lehigh Portland Cement Company, grinding machinery for new 2,000-bbl. plant to be erected at Ormrod, Pa.; Quaker Portland Cement Company, grinding machinery for its 4,000-bbl. plant to be erected at Stockertown, Pa.; additional mills for the Lehigh Portland Cement Company at mill D, in Mitchell, Ind., mill A. Ormrod, Pa., mill B, West Copley, Pa.; additional grinding machinery for the Iroquois Portland Cement Company, Caledonia, N. Y., and also for the Wolverine Portland Cement Company, Coldwater, Mich., and the Bronson Portland Cement Company, Bronson, Mich.

TRADE CATALOGUES.

A pamphlet of unique design issued by the Joseph Dixon Crucible Company, of Jersey City, N. J., calls attention to the merits of Dixon's graphite, as a lubricating compound for gears, valves, cranks, axle bearings, etc.

The Scully Iron and Steel Company, of Chicago, Ill., has issued its stock list for January and February. The company deals in steel plate, boilers and tanks, bar iron, structural shapes, steel floor and roofing plates, bolts, rivets, boiler tubes, wire rope, iron workers' tools, etc.

The Allis-Chalmers Company, of Chicago, Ill., has sent to its friends a cast iron souvenir of the first heat taken at the foundry at the West Allis Works at Milwaukee, Wis. It is about 5 in. long. Two 1½-in. holes have been bored through the upper surface, and these contain bronze medallions of Chief Engineer Edwin Reynolds and of the mammoth works at West Allis.

The Ottumwa Box Car Loader Company, of Ottumwa, Ia., has just put out a very handsome catalogue, No. 5. This catalogue contains many illustrations of loaders from photographs taken of the machines at some of the most prominent mines in the United States. The loaders are shown in numerous positions, and these cuts very clearly illustrate how the machine is operated. The company will gladly send catalogues to any one interested on receiving a request to do so.

Watertown engines, single acting or tandem compound, especially designed for high speed work, are described in a handsome pamphlet, published by the Watertown Engine Company, of Watertown, N. Y. This company states that it has had nearly 60 years' experience, and has made every variety of steam engine from the smallest throttling engine to the most expensive type of compound automatic. The pamphlet describes in detail the construction of the various parts of Watertown engines, pointing out individual merits.

A pamphlet that will interest all engineers or owners of boiler plants, having trouble from impure feedwater, is issued by the W. B. Scaife & Sons Company, of Pittsburg, Pa. It is an illustrated treatise on the softening and purification of water by the Scaife and We-Fu-Go systems. The pamphlet takes up the impurities in water, the incrustations formed in boilers, the cause of priming, and the chemical treatment of feed-water. The We-Fu-Go and Scaife systems are described in some detail, their differences and advantages being pointed out. The pamphlet is printed on a fine grade of paper, the illustrations are of unusual excellence, and the publication will doubtless receive the commendation it deserves.

Catalogue No. 5, issued by the Stephens-Adamson Manufacturing Company, of Aurora, Ill., is a pamphlet of 77 pages, containing a description of the company's belt conveyors. The company calls attention to the simplicity, efficiency, cleanliness, durability and economy of belt conveyors, and states that it is prepared to submit propositions for necessary equipment to mines, clay and cement works, reduction plants, coal yards, gas works, chemical works, iron and steel plants etc. Special features of the company's conveyor system are independent troughing and supporting rollers, reducing the wear on the conveying belt, and self-adjusting and self-lubricating dust-proof bearings carried outside of the belt. The rollers, lubricating device and carrier stands, are illustrated in detail, and the company calls particular attention to the merits of its direct-pull take-up bearing, and self-propelling trippers.

Catalogue B issued by the Emerson Pump Company, of Washington, D. C., describes the Emerson steam vacuum pump, stated to be a new invention in the line of steam vacuum pumps, its style and the method of operating the steam valve being covered by patents. Some of the merits claimed for the pump are simplicity, handiness, durability, efficiency. and economy. The height to which the pump can raise a liquid is said to be limited only by the steam pressure that can be carried in the boiler, four Emerson pumps having been used for pumping out a flooded mine 200 ft. deep. The pump is made in 6 sizes, having a capacity of from 100 to 1,200 gal. per minute against a head of 100 ft. The pump is recommended for irrigation purposes, for general contractor's work, for supplying railway water stations, or for use about quarries, brick-yards, concentrating mills, etc. Numerous testimonial letters from mining companies, contractors and others are given.

"The Secor System of Power" is the title of a 26-page pamphlet containing descriptions of automatic oil-electric machines, oil-electric plants and Secor engines, manufactured by the General Power Company, of New York City. The pamphlet states that a low-cost, ready-to-use and easily obtainable fuel is a basis for low cost and universally available power, and points out the merits of kerosene as fuel. The Secor engine is claimed to be the only engine which combines the best qualities of the steam engine with the thermo-dynamic advantages of the gas engine. The pamphlet states that the engine can be easily, promptly and positively started. The Secor system of power obviates the use of a pressure fuel supply, hit or miss governing, or evaporizers. The oil is supplied to the cylinder in its natural liquid form at atmospheric pressure and not as a vapor. Electrical ignition of the hammer-brake type is used. Regulation is by variable pressure. The fuel-supply mechanism maintains a supply of combustible mixture proportioned to produce the energy required to keep up the rated engine speed. The engine is particularly recommended for use with independent electrical lighting plants.

SPECIAL CORRESPONDENCE.

Denver. Feb. 9.

(*From Our Special Correspondent.*)

The most important events of the week were the recording of the articles of incorporation of the Frontier Coal and Steel Company, and the announcement by Mr. David H. Moffat that a large steel plant will be built near Denver in the near future. The incorporators of the Frontier Company are: Mr. David H. Moffat, Mr. William G. Evans and Mr. Charles J. Hughes. These are the only names connected with the enterprise disclosed so far.

Mr. Moffat is the president of the new Denver, Northwestern & Pacific Railway, now being built from Denver to Salt Lake, which will reduce the present time of travel between the two cities at least 10 hours. Thirty-three years ago he co-operated with the late John Evans in building the Denver & Pacific Railway between Denver and Cheyenne, thus connecting, in 1869, Denver with the Union Pacific Railroad. He was formerly president of the Denver & Rio Grande Railway. He personally furnished $70,000 to build an extension from the Denver & Rio Grande Railway at Wagon Wheel Gap to Creede. This extension was only 9 miles long, but the traffic proved so great that it repaid the whole of the principal in 90 days. Mr. Moffat was mainly instrumental in building the Florence & Cripple Creek Railroad, personally furnishing $1,000,000 for its construction and equipment during the panic year 1893. Mr. W. G. Evans is the president of the Denver City Tramway Company and vice-president of the Denver, Northwestern & Pacific Railway. Mr. Charles J. Hughes is a lawyer, a wealthy man, and one of the directors of the Denver, Northwestern & Pacific Railway.

Mr. Moffat says that the Frontier Coal and Steel Company assures a new steel plant within the next

year, somewhere between Denver and either Greeley or Boulder. The site has been selected, but there are many reasons why it should not be known at present. The plans have been completed, and are only held in abeyance for the building of the line from Denver to Salt Lake. It is, in fact, the building of the railroad which has made the steel enterprise possible.

Mr. Moffat further says that the new company will have, among its holdings, a large area of coal lands along the line of the new railroad, as well as limestone and iron ore. With the exception of the Continental Divide, 60 miles west of Denver (through which the new railroad will pass by a 2-mile tunnel and, pending the completion of such tunnel, by a switchback over the crest) there will be a down-hill haul of the raw materials to Denver. The new company will begin at once to develop its coal fields and to prepare for coke ovens. Mr. Moffat feels confident that the work on the steel plant will be begun within a year. Every branch of steel manufacture will be represented in the new plant.

Henry Denman, Colorado State Inspector of Coal Mines, in his official report for 1899-1900, gives the accessible area of the Yampa coal-field in Routt County (which will be tapped by the new railroad) as 440 square miles, with an available gross tonnage of 5,961,500,000 tons. Prof. Arthur Lakes, who for many years occupied the chair of Geology at the Colorado State School of Mines, says of one plateau about 25 miles northwest of Steamboat Springs, that almost the entire plateau is underlaid by a number of coal seams, including anthracite, and it is probably the largest area of anthracite in Colorado or west of the Mississippi. The present supply of Colorado anthracite is drawn from a small area near Crested Butte, Gunnison County and, so far, from one mine only. Outside the anthracite, Prof. Lakes pronounces the other coal to be adapted to domestic, coking and blacksmithing purposes, and says the plateau covering these particular coal beds is about 25 miles in extent.

The coal fields of Routt County are now 100 miles from the nearest railroad, thus prohibiting mining. The new railroad will admit of the coal being shipped to a wide territory. THOMAS TONGE.

Joplin. Feb. 7.

(From Our Special Correspondent.)

Preparations are in progress to prospect a body of land at Oronogo, owned by General John W. Noble, Secretary of the Interior under President Harrison. Heavy pumping machinery is to be installed in an old shaft.

Reports from the territory adjacent to Baxter Springs, in Kansas, and over the line in the Indian Territory, are more promising each week. Ore has been found in paying quantities in 2 shafts, and has been developed by drifting. Drilling has disclosed a steadily widening mineralized area.

The Waddell Zinc Company has encountered zinc in a third drill hole on the Amsden land at Carthage, 2 miles from the nearest development work.

Selected specimens of zinc ore from the Turkey Creek country in Taney County have assayed 50.5 per cent zinc.

Ore is now mined in the vicinity of Ozark in Christian County, averaging 48.1 to 48.8 per cent zinc. It is mined on a 35-ft. level, with a 12-ft. face, varying in width.

Active prospecting in the ground of the New York Zinc Company, near Galena, Kan., is resulting in the development of the ore shoots lost by previous operators. The results are an increasing output of lead.

A cave-in at the mine of Scott & Coleman, near Aurora, is threatening serious damage to their mill. Thorough drainage of the ground is believed to have been the cause, as the cave occurred where very little cutting had been carried on. It made an opening on the surface 30 by 100 ft., and is spreading.

The Baltimore Mining Company has started a new mill in the Chitwood group, near Joplin.

The Wurzel Mining Company has been organized to operate a mine on a lease of 21 lots of the land of the Roaring Springs Land and Mining Company, near Joplin. Lead has been developed on the 73-ft. level, with zinc below.

The Excel Mine, of the Clinton Mining Company, recently purchased by Pennsylvania parties, has developed an extensive stoping surface of zinc ore. The U. & I. Mining Company has found by drill an extension of the Excel ore shoot on its property adjoining. These two properties are within the corporate limits of Joplin.

The Plymouth Rock Mine, near Joplin, owned principally by Oscar A. Newell, of Central Falls, R. I., has opened the ore shoot in No. 4 shaft on the 120-ft. level, and is outputting 10 tons of zinc ore each shift. The Black Diamond is a new producer on land adjoining the Excel Mine.

San Francisco. Feb. 5.

(From Our Special Correspondent.)

Storms in the mountains continue without much interruption. Snow has fallen in nearly all the counties, not excepting those bordering on San Francisco Bay, where such an event is quite unusual. In the higher ranges there has been a heavy fall, ensuring a good supply of water in the Sierra streams during the coming summer. Just now, with plenty of water flowing, the hydraulic miners are very busy and will move a vast amount of auriferous gravel.

The principal topic of interest among mining men during the past week has been the final settlement of the big strike of the miners and smelter men at the Mountain Copper Company's property in Shasta County. Mr. Lewis T. Wright, the general manager, closed down the entire plant in preference to making any concessions which would compel him to employ union men only and take back men he had discharged for what he considered cause. During the past week some 400 men have been engaged, including strikers, old employees and new men. Mr. Wright makes no change whatever in the policy at first adopted. The company does not concern itself with the affiliations of employees with labor unions, and employs or discharges whom it likes. It gives no official recognition to the Western Federation of Miners dealing directly with its employees. The striking men claim a victory because strikers were taken back to work with others; but the fact is, Mr. Wright preferred old employees with experience, and those with families who had formerly worked for him. He declined to take back anybody who had been guilty of any violence or overt acts. The settlement is very satisfactory, since the largest plant in the State may work again.

In a suit for commission on a mining sale in Southern California rather a novel point is made. A man got an option on a property for 40 days, and was to have 10 per cent if he made a sale, He sold half his option to another, and the two men found purchasers of the property for $75,000 after an examination of the mines. According to the complaint the defendants kept the mine flooded so no examination could be made, and the sale fell through. Hence the suit for $10,000 commissions and damages.

The question of a State mine inspector has not been settled in the Legislature, and it is hardly probable that the bill creating this new office will pass. Most mine owners are opposed to it on general principles. There are in California 5,850 quartz mines and claims kept active by regular work or annual labor. There are also 443 drift mines and 523 mines of miscellaneous character, such as quicksilver, copper, etc., in which underground work is done. This makes 6,612 mines which, if visited annually, would require the inspector to look up over 500 mines per month. One man could not possibly visit half these mines and inspect them, and a horde of deputies would be necessary. With a number of subordinates having power to compel people to sink new shafts or otherwise make changes, there would be much opportunity for blackmail. Hydraulic and other surface mines are not considered in the enumeration of active properties above.

Some people in Los Angeles are again going to try to make a tin mine pay. This mine is in Orange County. The company owns a 10-stamp mill, cyanide plant, electric light plant, blacksmith shop, etc., assay office, buildings, teams, mining tools, etc., and apparently started a gold mine, which then turned into a tin mine. It is said to be close to the Temescal tin mines "purchased and shut down by the Tin Plate Trust." Now the old Temescal tin mine was not shut down by the Trust, but because there was never tin enough there to pay, though some Englishmen put up $1,000,000 or so to find out the truth. Some little tin was produced at much more than its cost, and a great fuss was made over it at the time.

The ore in the Orange County mine is said to be about ¾ per cent tin, but "better ore is expected with depth." If the experience of Dakota and of California itself is to be considered there is more profit in tin mining on paper than in the ground. However, lots of people like to invest in new things, and here is a chance.

There is considerable activity in the niter and borax fields in Inyo and San Bernardino counties, and much borax land is being taken up. Heavy shipments of borax are made, and the statements of interior papers would lead one to believe that shipments of niter are also frequent. The fact is, however, that no niter whatever has yet been produced in this State. The fields are claimed to be very extensive, but there is still some little mystery as to the percentage. The matter is being investigated, but thus far little or no work has been done on the properties, which are still in the prospect stage.

There has been some little stir in Tonopah, Nevada, mine shares. The mines are producing well, and the owners claim that they have many millions of ore in sight. The ore is generally found within about 500 ft. The place is still growing, and bids fair to become the most important in Nevada. It holds the leading place in the public eye at present. The camp wants mills and water to be as successful as it should.

London. Jan. 23.

(From Our Special Correspondent.)

The South African mining market has been quite inactive all week. The success of Mr. Chamberlain's tour does not affect speculation in the least, and the settlement of the question of the burden of taxation to be borne by the mines is just as ineffective. Those who desire a rise are at their wits' end to invent another excuse for the dullness and absence of booms. Their prophecies have come wrong so often that they have given up trying to explain the causes of the dullness, and to prophesy booms when certain deterrent causes are removed. The market has been mildly amused this week by the utterances of Mr. J. B. Robinson, a South African magnate, celebrated for his independence, or some people would say contrariness, of opinion. He has recently been objecting to the gold mines paying anything towards the expenses of the war, and objecting also to the control of South African affairs by Downing Street, otherwise Mr. Chamberlain. No doubt we are all selfish at heart, and as shareholders in gold mining companies we wish to keep down expenditure in all possible ways. But there is a limit to greediness and meanness, and any one who publicly advertises his desire to shirk his due share of the expenses of the war plays a very unpopular role. Mr. Robinson is the only Rand magnate who considers the burden imposed on the gold mines greater than can be borne, for the terms of the taxation were arrived at by the assistance and advice of the Johannesburg houses. Mr. Robinson's attitude is therefore undignified and unfriendly, and cannot do any good to himself or his companies.

The market has been stirred up a little this week by the publication of a scheme for the amalgamation of several leading West Australian mines—the Associated, the Oroya-Brownhill and the Associated Northern Blocks. The first and third of these are under the control of Mr. Landau, who took them over when Mr. Bottomley cleared out, while the Oroya-Brownhill is a recent amalgamation of Hannan's Oroya and Hannan's Brownhill. The scheme put forward for the present amalgamation emanated from Mr. Landau, and his companies are unduly favored at the expense of the Oroya-Brownhill, so that it is certain to be rejected by the directors of the latter. I should add that amalgamation of all the leading mines has been discussed extensively during the last year or so, and no doubt in some ways many advantages and economies would be obtained thereby. It is practically impossible, however, to arrange fianancial terms to suit everybody, nor would any of the controllers be willing to sink his lead in favor of a rival. In connection with the present amalgamation, it has been rumored in the market that other mines were to join the Ivanhoe, Lake View, Perseverance and others. These rumors were obviously wrong, for Mr. Gardner, the controller of Perseverence, and Mr. Kaufman, controller of Ivanhoe and Horseshoe, are not amalgamators but absorbers, and no terms would suit them that did not provide for their being "head of the army" and "boss of the show."

Another point of interest in the West Australian market is the announcement of the opening of the Coolgardie Water Supply Works. This supply of water will cost 7s. per 1,000 gals., and will reduce the costs at the mines considerably. Most of the leading mines, however, have excellent distilling and condensing plant, such as is used at sea, so that they will not use much of the public supply. At new mines and at those not supplied with such plant the public water will be of great service, though the price is so high as to make it necessary still to study economy. The chief advantage of the new supply is the improvement in household conditions. It will reduce the cost of living in the district appreciably.

The Mount Morgan Company has decided to remove the liability on the shares. The company has a capital of £1,000,000 in £1 shares, of which only 17s. 6d. is paid up. Dividends amounting altogether to £5 17s. 4d. have been paid since the incorporation of the company in 1886 to the end of 1901. They have been paid with great regularity, and there is no prospect of any break for years to come. When the company was formed the whole of the shares were allotted as purchase price, as no money was required for working capital. The shares were credited with only 17s. 6d. paid up to provide a fund for eventualities, which would have to be paid by the vendors. The *bona fides* of the vendors has been so thoroughly established by now that there is no need for this reserve fund. Besides, so many of the shares are held by other people that the liability is out of place. It has therefore been decided to declare a special dividend of £125,000 out of profits and then to call up the same amount. The money will afterwards, of course, be available for redistribution once more.

Your readers will remember the two Americans, J. H. Brotherton and J. C. Kemp Van Ee, who exploited the British public with their Poorman, of Idaho, property some eight years ago, besides carrying on similar proceedings in connection with West Australian ventures. A year or two ago they made an attempt to work the public here once more, but wisely refrained from coming here personally or using their own names. They succeeded in finding some people of no importance to help them float a company called the Royal Consolidated Mines (California) Company, Limited, to acquire from Mr. Van Ee some property in Calaveras County, California. Fortunately, however, Messrs. Brotherton and Van

Ee have fallen out, at least that is my interpretation of the fact that Mr. Brotherton is advertising in this country that there is an action pending between himself and Mr. Van Ee with regard to the title of the properties involved. As I say, this is my interpretation of the advertisement, but in connection with these gentlemen it should be remembered that "things are not always what they seem."

The report of the Le Roi Company for the year ended June 30 last has just been issued, but owing to the delay in publication it has lost much of its interest. There has been a loss on the year's working of £46,550, as certified by the auditors. The directors add that since that time the general manager has reported to them that on December 31, 1902, the net assets exceeded the liabilities by $397,000. As this latter statement is merely an estimate it is not of great value in helping us to form an opinion of the present state of affairs. The directorate of the company has been continuously changing during the last eighteen months, owing to the fact that first of all Whitaker Wright's people were cleared out and afterwards the directors who captured the company found they had not made such a good speculation as they had anticipated, and so resigned. The directorate now consists of Sir Henry Tyler and Messrs. Jewell, McMillan and Waterlow. All of them are intimately acquainted with British Columbia, and the last two are directors of the Snowshoe. The outlook for Le Roi is now much more hopeful than it ever has been since it has been in English hands.

GENERAL MINING NEWS.

Bituminous Miners' Wage Scale.—The miners and operators of the competitive soft coal districts agreed at Indianapolis on February 7 upon a scale of wages for the year beginning April 1. The price for mining is to be increased 10c. a ton on 1¼-in. screened lump coal, pick mining, in western Pennsylvania thin vein, the Hocking, the basing district of Ohio, and both the block and bituminous districts of Indiana; 6c. a ton on mine run coal, pick mining, in the bituminous district of Indiana, and at Danville, the basing point of Illinois.

The price of machine mining is to be increased 8c. a ton on screened lump coal in western Pennsylvania thin vein, and the Hocking, the basing district of Ohio; 10c. per ton on screened lump coal in the block and bituminous districts of Indiana, and 6c. a ton on mine run coal in the bituminous district of Indiana and at Danville, the basing point of Illinois.

The inside day wage scale is to be as follows, with the conditions of the Columbus day wage scale agreement of 1898: Track layers, $2.56; track layers' helpers, $2.36; trappers, $1.13; bottom cagers, $2.56; drivers, $2.56; trip riders, $2.56; water haulers and machine haulers, $2.56; timber men, where such are employed, $2.56; pipe men, for compressed air plants, $2.50; company men in long wall mines of third vein district of northern Illinois, $2.36; all other inside day labor, $2.36. Yardage and dead work are to be advanced 12½ per cent. In addition to the above, the operators verbally agreed that outside day labor should be increased 12½ per cent in Ohio, Illinois and Indiana, and that in the Pittsburg District there shall be an increase of 12½ per cent, except where prices have been advanced during the present year. In these cases, sufficient increase shall be granted to bring the amount up to 12½ per cent increase, and where more than 12½ per cent was secured the wages shall not be reduced. In the mines of the Monongahela Company the advance shall be a straight one of 25c. a day.

At the meeting of the scale committee the Indiana miners agreed to withdraw the shot-firing bill from before the State Legislature, where it is a special order for Monday.

The wage scale signed directly affects the wages of 25,000 miners in the Pittsburg District, 33,000 in Ohio, 9,000 in the Indiana bituminous fields, 3,000 in the Indiana block coal fields, and 40,000 in Illinois.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Company, Limited.—At a meeting of the directors recently held in London, reports were submitted showing the results for the year ending September 30 last. After carrying £40,000 to reserve, the surplus, including £14,410 brought forward from previous year, was £220,879, after deducting the preferred dividend a balance of £196,348 was left. The directors resolved to recommend the payment of a dividend of 9s. 6d. per share on both the preferred and deferred stock. On account of this dividend 4s. per share was paid July 30, and the balance of 5s. 6d. will be paid February 25. This dividend will absorb £180,487, and leaves a balance of £15,860 forward the current year. The dividend is at the rate of 47½ per cent on the par value of the stock.

Shannon Copper Company.—The concentrator at Graham is about ready to start. The machinery is all on the ground. While the smelter has been shut down awaiting the completion of the concentrator, the company has been pushing development, and is reported to have over 5 miles of workings.

COCHISE COUNTY.

(*From Our Special Correspondent.*)

Tombstone Consolidated.—Work of development is progressing favorably. In the third week of January 11 ft. of sinking was accomplished in the main shaft. The amount of water averaged about 800,000 gals. in 24 hours, with occasional rushes carrying the quantity up to the rate of 2,000,000 gals, for short periods. On January 26 the influx of water was 1,157,000 gals., the shaft being 75 ft. below the water level or 105 ft. below the old Contention 600-ft. level.

The Tranquillity and Empire shafts have been connected on the water level, and the drift is to be further extended on the dike. The vein has been cut in the Flora Morrison on the 3d level rest, and there appears to be a very valuable body of ore at that point. The principal shafts of the camp are being repaired and put in readiness for sinking as the water recedes. There is no difficulty in handling the water, and at no time has even fair speed been required of the pumps, which are working admirably.

GILA COUNTY.

(*From Our Special Correspondent.*)

Old Dominion.—The pump at the 1,200-ft. station on this mine at Globe is in operation, and all the ground is unwatered.

Troy-Manhattan Company.—Smelting has been resumed by this company, near Globe.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Altata.—John Schemmilphennig and A. H. Dryden, who are leasing on this mine, near Chloride, have encountered a rich body of ore on the 200-ft. level.

C. O. D.—Tnis mine, in Todd Basin, is to resume work.

Gold Roads Company.—This company, at Acme, is erecting a 500-ton cyanide mill. The largest force of men ever employed on any mine in the county is at work.

Katherine.—S. C. Bagg, superintendent of this mine in Minnesota District, is drifting on the hanging wall at 185 ft.

Leland-Mitchell.—This mine, at Acme, is having 4 tunnels driven under the mountain. Walter Fellows is superintendent.

Mellon.—This mine, at Acme, will soon have a 40-stamp mill in operation. The property is owned by G. A. Turner, of New York.

Monmouth Development Company.—Extensive work is going on in mines on Burro Creek, and a milling plant is contemplated.

Poorman.—This mine, at Walker, is being worked under bond by J. W. Francis, of Flagstaff. The shaft is being sunk. A vein 4 ft. wide carries values in gold and silver. The owner, A. H. Mitchell, is superintendent.

Samoa.—The Hoffman Brothers, Manvel, Cal., who recently took a bond and lease from Messrs. Frank P. Arbuckle, of Denver, Colo., have opened shipping ore. The Fourth of March claim is also in shipping ore. Both are on Cerbat Mountain, near Chloride.

Union Pass.—W. A. Mensch, manager for the company owning these mines at Union Pass, is having a shaft sunk in the tunnel where a 4-ft. vein of milling gold ore is exposed.

YAVAPAI COUNTY.

(*From Our Special Correspondent.*)

Alta.—The shaft on this claim, near Bigbug, is down 150 ft.

Gold and Copper Mining and Milling Company.—This company, near Prescott, has a cyanide plant at the mill.

Iron King.—This mine, near Jerome, owned by the American Copper Company, is having a 100-ton mill erected.

Red Apache.—The tunnel on this mine in Walker District, is in 155 ft., with 3 ft. of ore carrying values in gold, silver and copper.

United Verde Smelter.—This plant, at Jerome, was temporarily closed recently, due to a shortage of coal.

CALIFORNIA.

AMADOR COUNTY.

Bunker Hill.—This mine at Amador City, C. K. Downs, superintendent, is shortly to have a 20-stamp mill.

Edinburgh Gold Mining Company.—Foundations are being put in for a plant at the mine near Jackson. David Fisher is superintendent. A new 2-compartment shaft is being sunk.

Fremont.—At this mine at Amador City very satisfactory rock has been found on the 1,000-ft. level. C. E. Purrington is superintendent and Arthur Goodall, secretary and manager.

Zeila.—This mine at Jackson, W. F. Detert, superintendent, is to resume operations in March.

BUTTE COUNTY.

Lancelle.—This mine, at Buckeye, near Mokelumne Hill, P. L. Shuman, superintendent, made a $3,000 clean-up recently.

Nelson Mining Company.—This company, near Calaveritas, has completed its ditch and turned the water in.

Penn Mining Company.—This company, of Campo Seco, A. C. Harmon, superintendent, is putting in a new hoist at its copper mine.

Queen.—This mine, near Murphys, has been bonded by Shaw Brothers to Eastern people.

Spring Valley.—This quartz mine, formerly owned by John Nesbit, is to be put upon the market and reopened. It is near Cherokee. There are 1,200 acres of patented ground in the location.

Wilbur-Womble Mining Company.—This company at Hodson, E. A. Braddock, superintendent, is working 25 men. Electric power is being installed to take the place of the steam plant.

EL DORADO COUNTY.

Golden Gate.—This mine, at Grizzly Flat, James Richards superintendent, is about to put in an air compressor and power drills.

River Hill Mining Company.—This company, of Placerville, Thomas Clark manager, has not yet decided to put a mill at the entrance to the tunnel, though a second mill may be built if the tunnel developments show ore sufficient to warrant. The tunnel is now in 1,400 ft. and has about 900 ft. yet to go.

KERN COUNTY.

Exposed Treasure Mining Company.—This company, near Mohave, Pierre Humbert, Jr., general manager, is operating a 20-stamp mill and has its water supplied through a 15-mile pipe line.

Karma.—At this mine, near Mohave, J. A. Gerner superintendent, a pipe line to supply the mine with water is being built. A spur track is being built from the mine to the main railroad line over which ore will be shipped to the smelters on San Francisco Bay.

MARIPOSA COUNTY.

Lady Helen.—This mine, 2 miles from Coulterville, owned by O. Shafe and Hansen Brothers, of Modesto, has a shaft down 100 ft.

North Star Mining Company.—This company has been incorporated at Merced, where its principal place of business will be. Some of the directors are David McNally, S. W. Dickinson, B. C. Turner, A. G. Clough and L. C. Wise.

Sweetwater.—This mine at Jerseydale, J. W. Jones superintendent, has temporarily closed down.

Tramp.—This mine at Whitlock is yielding rich ore to James Helm and Clyde Czerny, who are working it.

NEVADA COUNTY.

Brunswick and Union Hill.—These mines, at Grass Valley, will shortly construct a pipe line from the South Yuba reservoir to the mines, a distance of 7,400 ft. The pipe to be used will be 22-in. diameter.

Empire Consolidated Quicksilver Mining Company.—Chancellor Magie, at Trenton, N. J., recently made an order requiring this company, Riley A. Bogges, of California, and William M. Dowie, of New York City, to show cause on February 9 in Jersey City why 379,985 shares of stock of the mining company should not be canceled as being fraudulently issued. This stock represents about four-fifths of the capital stock of the company, and is held by the North American Trust Company in trust for Bogges and Dowie. The company was incorporated in June, 1900, when 100,000 shares of a total par value of $1,000,000 were put on the market. Among those who acquired the stock are William J. Patterson, New York City; A. Z. Conrad, New York City, and G. W. Crosby, Atlantic City, who bring this suit. They charge that the stock sold realized $600,000 and that 379,985 shares held in trust for Bogges and Dowie represented no actual investment, and was acquired by them without the knowledge of the actual investors.

Heuston Hill.—This mine at Grass Valley is being worked through the Orleans, C. A. Brockington superintendent. The water in the Heuston Hill is being drained by work done in the Orleans. For three years Superintendent Brockington has been at work on the Heuston Hill, and now about 28 men are employed, who have taken their chances with the owners, working for enough to give a living and taking the rest of their pay in stock. In this way 27,000 shares have been purchased with labor since the mine opened.

Union Hill.—The mill recently purchased from the English Mountain Company by this mine at Grass Valley, E. C. Crellar, superintendent, is almost ready to run. The stopes in the mine show a high-grade milling ore.

RIVERSIDE COUNTY.

Iron Chief Mining Company.—This company, near Walters, has purchased new engines and hoist.

SAN DIEGO COUNTY.

A number of locations of marble quarry ground have been made near Imperial, by D. C. Collier, Jr., S. F. Smith, James McMullen and George W. Fitch. The claims are on the Coyote Mountains in the desert region of the county, and it is stated that the marble is of good quality.

Free Gold.—The cyanide plant at these mines near Hedges returned $9,336 in January. Charles W. Pauley is receiver at this property.

SHASTA COUNTY.

Bully Hill.—A new compressor of large capacity has been received at these mines, near Winthrop. John B. Keating general superintendent. The recent storms damaged the plant at the smelter to the extent of about $3,000.

SISKIYOU COUNTY.

A. C. Brokaw.—This property at Quartz Hill has a compressor operating the drill, pumps, etc.

Barton.—This mine, being operated by the Michigan Company at Buckeye Bar, Klamath River, has started with a good supply of water.

Cherry Hill Mining Company.—This company has 20 men running its tunnel. The tunnel will tap the ledge deeper than in any other mine in that section of the county.

Siskiyou Electric Power Company.—This company, which has its plant at Fall Creek, on Klamath River, will supply 12 mines with electric power. A ditch 4,800 ft. long has been completed, which will carry the waters of Fall Creek to a point about above the power house, where a fall of 700 ft. is secured to develop electricity.

SONOMA COUNTY.

Banner.—This gold mine, 4 miles south of Cloverdale, discovered 40 years ago and abandoned, will, it is said, be reopened by Arizona men. The property is owned by people connected with the Italian-Swiss colony.

Culver-Baer.—The furnaces at this quicksilver mine are expected to be in running order about the end of this month. A deposit of rich ore was recently found while building a road.

Socrates.—An action has been commenced in the Superior Court to quiet title to a large portion of this quicksilver property. The court is asked to decree that the purported interests of a number of persons who have been made defendants do not exist.

TRINITY COUNTY.

Black Diamond.—This mine, near Junction City, owned by La Baree & Morris, has a 16-ft. ledge and is looking well.

Integral.—At this quicksilver mine, near Cinnibar, 25 men are at work and 2 furnaces are kept running. The shaft on the mine is 400 ft. deep.

TUOLUMNE COUNTY.

Mack.—This mine, owned by the Big Casino Company, at Big Oak Flat, is running 10 stamps night and day.

Rawhide.—This mine, at Jamestown, W. A. Nevills owner, is employing 100 men.

Star.—This mine, near Columbia, has been temporarily closed down and 15 men laid off.

YUBA COUNTY.

Marysville Tunnel and Quartz Mining Company.—At a meeting at Marysville recently the following directors were elected: J. J. Williams, P. J. Williams, J. A. Maben, F. E. Smith and I. E. Wallis. The directors organized by electing P. J. Williams president and superintendent; J. J. Williams, vice-president; F. E. Smith, secretary, and J. A. Maben, treasurer.

Miller.—This mine, between Brownsville and Forbestown, is to resume work. The development consists of an inclined 2-compartment shaft 200 ft. deep, with a 325-ft. drift at the 150-ft. level on the vein, and 80 ft. of cross-cuts. A drain tunnel 1,000 ft. long connects with the shaft at the 200-ft. level. One ore shoot is reported 150 ft. long, and averages 5 ft. wide. A second shoot is 250 ft. long, and averages 20 ft. wide. The ore, on the whole, is low grade. The mine is equipped with a shaft house, hoist, 20-stamp mill complete, and all necessary buildings.

COLORADO.

BOULDER COUNTY.

Longfellow.—This mine, at Jamestown, is reported sold to the New Century Mining and Milling Company, of which R. G. Munn is manager, for $200,000. The mine has yielded some fine specimens of free gold and tellurides.

HINDSDALE COUNTY.

Dwyer Mining Company.—This company has taken a bond and lease on the Inez and Hollister claims, which adjoin the famous Isolde Mine, owned by the company. The price named is $80,000. This will enable the owners of the Isolde to develop their property at greater depth.

COLORADO.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Leadville Ore Output.—Tonnage figures include all classes of ores, and show an output of 70,000 tons for January. The American Smelting and Refining Company bought 60,000 tons, most of which was treated by the Leadville plant. The shipments to the Salida Smelter and to zinc smelters make up the balance.

Amity.—Some high-grade ore has been shipped from this St. Kevin property recently. Important new work is planned for the summer.

Caribou.—A large amount of development is being done and enormous fair grade iron bodies have been opened from which the production is 200 tons a day.

Fryer Hill Mines Company.—The new shaft on the Pride of the West is making good headway. Some high-grade ore is also coming from the shaft. Much development is under way.

Iron Silver Mining Company.—Unconfirmed rumors are going around of a sale. The presence at the mine of English experts adds coloring to reports. A. R. Meyer, the head of the Yak combination, is credited with having his eye on the territory. The Moyer is now producing 6,500 tons of good grade iron a month, while a new shaft is going down some 1,800 ft. distant. In spite of adverse conditions last year the Moyer paid over $100,000 dividends.

Jay Bird Combination.—Arrangements are under way to lease the Jay Bird, Frank and Grover Cleveland claims to Denver people. A Wilfley mill is to be included. A quantity of $5 and $6 ore is opened in the Frank. Both properties have been extensively developed. J. J. Crook, of Leadville, is the owner.

La Plata Imperial Mining Company.—This English concern owns the La Plata property on Rock Hill. Local lessees deny that there has been any trouble over the lease with the London owners. Under the direction of James Shinn the Argal lease has been producing some ore and paid some dividends and the mine is still worked.

Matchless.—Mrs. H. A. W. Tabor, wife of the late Senator Tabor, owner of the Matchless Mine, has renewed her litigation against Newell, Page and others, asking for $3,200,000. Some of the charges made are ridiculous. It is evident that the case will involve a long legal wrangle and the property will remain idle.

New Leadville Home Mining Company.—About 75 tons a day of fair-grade iron are being shipped. The water flow is not very heavy, and prospecting is pushed in virgin ground.

Small Hopes Combination.—The lead sulphide bodies are being developed and shipments average 175 tons a day from the R. A. M. shaft, about 75 tons of the lead-zinc going to the Empire Zinc Company at Canon City, while the rest in the shape of zinc sulphides goes principally to Belgium.

Valentine Mining Company.—The sulphide ore stringers in the new drift of the Valentine are becoming frequent, and are being followed in the hope of catching the extension of the iron bodies. The pumps are handling a 600-gal. flow.

Yak Mining, Milling and Tunnel Company.—Good headway is being made on the extension toward the Ibex ground. The tunnel is now within 200 ft. of the Ibex No. 4 shaft, the lower workings of which will be 250 ft. above the tunnel. The tunnel will prove valuable as a prospecting as well as a drainage proposition.

TELLER COUNTY—CRIPPLE CREEK.

Pharmacist Gold Mining Company.—Shipments by lessees in January totaled 200 tons of an average value of $30. The company is reported to have a respectable amount on the right side of its books from royalties paid by lessees.

Stratton's Independence, Limited.—A report is in circulation that from 3 to 5 ft. of rich ore has been found in the 4th level south, of Stratton's Independence, but no confirmation can be obtained. Manager tion and from that point 2 powerful station pumps in the 1,500-ft. level running at once. This pump weighs approximately 60 tons, and has a lifting capacity of 1,000 gal. a minute to a height of 1,000 ft. The water will be raised, however, to the 900-ft. station and from that point 2 powerful stations pumps already in place will throw it to surface.

IDAHO.

SHOSHONE COUNTY.

Benton Mining Company.—This company has been incorporated at Burke. The incorporators are John Callahan and W. H. Smith, of Burke, and B. N. Hillard, James Callahan and Theodore Anderson, of Wallace. The company is incorporated for $1,250,000, with the par value of the shares at $1. The property controlled is near Burke. Some prospect work has been done and a 4-in. stringer uncovered.

Bunker Hill & Sullivan Company.—About 100 men were recently given a short layoff by this company on account of the upper slopes of the Stemwinder claim being well worked out, and the lower ones not being opened sufficiently to accommodate the full force of men.

WASHINGTON COUNTY.

Boston & Seven Devils Copper Company.—The 100-ton smelting plant, 8 miles above Weiser, has been sold under execution issued out of the United States Federal Court. The Stearns, Rogers Manufacturing Company, of Denver, Colo., were the purchasers, they having a claim against the plant for $24,000 for machinery furnished. The building, machinery and grounds on which the smelter is located were bought in by Stearns & Rogers, through their representative, C. A. Ballerich, for $19,500.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

Rhode Island.—This company has issued a statement of receipts and expenditures for the year ending December 31, 1902. The statement shows a balance on hand January 1, 1903, of $93,729. There was expended during 1902 for mining expenses, taxes, etc., ,59,040. The superintendent's report states that operation on No. 1 shaft have been discontinued, and the shaft allowed to fill with water, as conditions do not warrant further work at this point. No. 2 shaft was sunk 505 ft., and has now attained a depth of 1,000 ft. The average number of men employed was 32. The opening work for the year was as follows: Sinking, 505 ft.; drifts, 531 ft.; cross-cutting, 256 ft.

(*From Our Special Correspondent.*)

Atlantic.—This mine produced 297¾ tons of mineral in January. Thirty-two drills are in commission, and rock shipments average 1,400 tons daily.

Baltic.—No. 3 shaft is down 765 ft., No. 4 750 ft., and No. 5 650 ft. New ground is opening rapidly, and the rock shipments average 1,350 tons per day. The ground reserves are large and the showing in the bottom levels is reported good.

Calumet & Hecla.—An additional furnace, making 8 in all, is in commission at the South Lake Linden Smelting Works. Nearly all the machinery for the new electric power plant has been installed at the stamp mills. It will supply power for the new sand wheel and the 6 stamps and wash equipment in the addition to the Hecla stamp mill.

Champion.—The third head at the new mill is expected to go into commission next week, when the fourth head at the Baltic Mill will be released. The mine is shipping 950 tons of rock to the Champion Mill and 475 tons to the Baltic Mill daily.

Franklin.—This mine produced 381¾ tons of mineral in January. The shaft at the Junior branch is sinking to the 16th level, and 11 drifts are opening.

Osceola Consolidated.—Hoisting has been resumed at No. 5 shaft of the Osceola branch. Fifteen drills are in commission and rock shipments will be gradually increased until they reach 500 tons daily.

Quincy.—Eight-ton skips are being installed at all the shafts to replace 6-ton skips. The enlarged skips have been in commission at No. 7 shaft for a month, and it is found that the increased load can be hoisted with slight increase in cost. The January output was 1,061¾ tons of mineral.

Rhode Island.—Capt. Thomas Dennis will retain the superintendency of this mine as well as that of the Adventure.

Trimountain.—A well-mineralized amygdaloid lode has been opened by a cross-cut 60 ft. west from No. 1 shaft at the 7th level. The lode has been cut 16 ft. without disclosing the hanging wall.

Wolverine.—The January output was 506¾ tons of mineral.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Miskwabik Development Association.—This company has been organized for the development of mineral lands 1½ miles north of the Mohawk Mine. Charles Smith, of Lake Linden, is chairman; Joseph Bosch, treasurer, and A. A. Guck, secretary. About 600 acres of land in section 5, T. 57, R. 31, and section 32, T. 58, R. 31, have been secured. Diamond drill work will start in the spring as soon as the snow leaves the ground. It is thought that the property carries the outcrop of the Kearsarge amygdaloid lode, opened at the Mohawk and Wolverine mines. Dr. L. L. Hubbard, general manager of the Copper Range Consolidated mines and former State geologist, is consulting engineer.

Mohawk.—The output for January was 347½ tons of mineral. The 2 heads are not treating their full quota of rock, but shipments from the mine are being increased. Twenty-seven drills are in commission. No. 3 shaft is sinking to the 7th level and No. 4 to the 6th.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Mass Consolidated.—This mine produced 75 tons of mass copper in January, besides the mineral from

the stamp mill. Sinking is in progress at A and B shafts. At C shaft drifts are being extended east and west at the 3d level on the Butler lode. The Knowlton lode has been opened by a cross-cut.

MONTANA.

BEAVERHEAD COUNTY.

Queen of the Hills.—According to reports, this property, in the Wood River country, may be sold in the near future. Minneapolis, Minn., men are after the mine.

POWELL COUNTY.

(From Our Special Correspondent.)

North American.—J. C. Shaubert, of Deed Lodge, has secured a bond to purchase this property in American Gulch, 18 miles north of Avon. The property has 2 shafts, 105 ft. and 100 ft. deep, respectively. The ore is gold, and from the present working it has shipped to the smelter $12,090 net. The bond runs for one year, and is for $15,000.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Manhes Process.—Judge Wallace has decided adversely the suit for infringement of the Manhes converter process brought by Franklin Farrel and Achille Migeon against the Boston & Montana Company. The decision is in line with the decision of Judge Wallace of the Southern District of New York, in the suit brought by the same plaintiffs against the United Verde Copper Mining Company.

Nipper.—The motion of Thomas McLaughlin to have Arthur P. Heinze taxed with the $16,000 allowed McLaughlin for his services as receiver for the Nipper Mine was decided by Judge Clancy on January 31 in favor of McLaughlin. An attorney's fee of $10,000 was also allowed McLaughlin's lawyers. J. M. Denny, representing the Heinze interests, was granted a stay of execution for thirty days, but was required to give a bond for $22,000.

NEVADA.

WHITE PINE COUNTY.

Chainman.—This mine, at Ely, is closed pending the remodeling of the mill. Fred Butler, the manager, is visiting Salt Lake, Utah.

NEW MEXICO.

COLFAX COUNTY.

(From Our Special Correspondent.)

The opening up of the new Dawson branch of the Chicago, Rock Island & Pacific system changes the coal supply prospects of northeastern New Mexico. This road runs from the Raton range southeastward 120 miles, striking the Rock Island at Tucumcari. The markets opened will be in western Texas and Oklahoma and far to the south in New Mexico, Arizona and Old Mexico.

Raton Oil Field.—The New Mexico Oil and Gas Company, of which A. C. Majors is secretary, has recently purchased a drilling outfit and will soon commence boring for oil on the McKown ranch.

The Raton Oil and Gas Company has been drilling for several months, and the drill has reached a depth of over 2,700 ft. It is expected to reach the Dakota sandstone in less than 50 ft. This sandstone is the oil reservoir to the north of Raton, at Trinchera, and other points.

The Newman Oil Company, operating on the Pecos River, near Santa Rosa, has reached a depth of 1,000 ft. A small oil stratum was tapped at about 700 ft. It is expected that the principal oil-bearing sand will be encountered at about 1,300 ft.

The Missouri Oil and Asphaltum Company, recently organized, proposed to develop at once some very promising oil properties situated on the Jordan Plains, about 20 miles north of Santa Rosa.

The Consolidated Oil and Fuel Company has also begun developing property in the vicinity of Santa Rosa.

Smuggler.—Reports indicate that a rich strike has lately been made. It is stated that the last ores shipped netted $90 a ton.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

Near Fruitland a thick vein of fine lignite coal has been recently discovered. The main prospects are on claims owned by Thomas Bryan and Harvey Towner.

A large number of oil filings have recently expired. Over 5,000 acres of these were immediately filed on by California oil companies.

Michigan Gold Mining Company.—This company has recently been organized with a capitalization of $1,000,000. It is expected that extensive developments will soon begin in the Hopewell District. The company is composed chiefly of Detroit, Mich., people.

SANTA FE COUNTY.

(From Our Special Correspondent.)

Baird Mining Company, the Industrial Placer Mining Company and the Interstate Placer Mining Company have begun operations in gold-bearing beds, east of the Una del Gato, west of the Ortiz Mountains. It is claimed that the beds are of considerable magnitude and carry good values.

Cerrillos District.—The Cerrillos Smelter is again operating to full capacity. Arrangements have been made to manufacture coke at the plant. Parties interested in the smelter have recently purchased a number of properties in the district, including the Great Western, Little Chief, Sure Winner, Bertha Mabel and Robert G. Ingersoll claims.

Placer Mining.—Placer mining in the San Pedro and Ortiz Mountains is beginning to receive considerable attention. Final entries are made on the Bender Group of 5 placer claims in the San Pedro Mountains by M. A. Shumard, of New Orleans.

Santa Fe Gold and Copper Company.—This company has temporarily closed down the smelter in the Golden District. The Santa Fe Central Railroad will soon have trains running on its new north and south line, and will reach Golden by a spur. This means cheaper fuel and fluxing materials and first-class transportation facilities for the whole district, which has long been handicapped. The smelter will probably start in early summer.

SIERRA COUNTY.

(From Our Special Correspondent.)

Black Knife.—These mines, near Fairview, are being actively worked. C. H. Laidlaw, the manager, has recently put on a new force.

Black Range Tunnel and Mining Company.—This company, capitalized at $1,000,000, will operate at Chloride. Matin Hardsocg, of Ottumwa, Ia., and Benjamin S. Phillips, of Chloride, are the principal stockholders.

Confidence.—Active work has been going on at this mine. At the 400-ft. level a cross-cut has been made about 150 ft. long, in order to reach the main vein. Considerable water has been encountered recently.

Gold Mining and Milling Company.—The mill in Ready Pay Gulch has again resumed operations.

Minnehaha.—At this mine, near Fairview, a new mill is being erected. The process has been modified somewhat and amalgamation introduced.

Porter.—The mines and mill at Hillsboro are expected to start extensive operations soon. The properties have recently come into the control of R. H. Hopper.

Prosper Gold Mining and Milling Company.—This company, of which A. J. Hirsch is general manager, has recently purchased new concentrating mills, which will be erected shortly. The main shaft is down over 200 ft., and is intended to go to 1,000 ft. as fast as possible.

NORTH CAROLINA.

GUILFORD COUNTY.

(From Our Special Correspondent.)

Empire Steel and Iron Company.—This company, under the management of Isaac Prosser, has the furnace in Greensboro in full blast turning out 80 tons of pug iron from ore mined near that city.

Fentress.—This gold and copper mine is in active operation, and reducing the ore on a 10-stamp mill, the result being so satisfactory that a 40-stamp mill and concentration plant is projected. The large quartz vein carries carbonate of iron, pyrites and chalcopyrite, all auriferous. The main shaft is over 300 ft. deep. Henry J. Dexter is president of the company, at Greensboro. The mine was formerly known as the North Carolina, and has a good gold record.

ROWAN COUNTY.

(From Our Special Correspondent.)

Reimer.—This gold mine, 10 miles from Salisbury, has been put into a company called the North Carolina Mining and Developing Company, with head office in New York. It expects to start work at once.

PENNSYLVANIA.

BITUMINOUS COAL.

J. G. McCorey bought 1,200 acres of valuable timber and coal land in Brushvalley township. The price paid for the land is said to be $30,000. The tract is situated between Brush Creek and the Blacklick. It was purchased from 8 different parties. There are from 500 to 1,000 acres of timber, and all the land is underlaid with coal.

Saltsburg Coal Company.—The properties of this company, consisting of 2 mines and about 1,500 acres of coal land in Westmoreland and Indiana counties, have been purchased by a syndicate, consisting of Capt. Alfred Hicks, president of the Allegheny Iron and Steel Company, and a number of Eastern capitalists. The Indiana County property consists of the Foster Mine, already opened, 40 houses, a locomotive and sidings at Edri station, while the Westmoreland County end of the purchase includes the Fairbank Mine, 2 mines southeast of Saltsburg, and connected with the West Penn by a branch road. It is planned to install modern mining machinery in order to increase the output. Coal will be shipped over the tracks and sidings of the Edri Coal Company.

ANTHRACITE COAL.

Lehigh Coal & Navigation Company.—This company has begun the construction of a mile of railway leading from the Central Railroad Company's tracks to a point back of Tamaqua, where a new breaker will be erected as soon as the weather opens. The new breaker will have a capacity of 1,200 tons daily, and 2 shafts 600 ft. deep will be sunk.

Lehigh Valley Railroad.—The directors recently elected are: E. B. Thomas, president; Ed. T. Statesbury, Joseph Wharton, B. Borie, Charles Steele, Irving A. Stearns, Abram Nesbitt, George F. Baker, J. R. Maxwell, George F. Baer, Robert C. Lippincott, H. McK. Twombly, Norman B. Ream.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Crown Point.—Dennis Henault, foreman, has commenced taking out mica for shipment.

Extreme Mining and Milling Company.—This company has been organized to work 500 acres of ground, including the London group, 3 miles from Custer, where a cyanide mill is to be erected. The principal stockholders, J. N. Wright, W. F. Wright, W. W. Wright, W. H. Chambers and Isaac Downing, of Custer, and J. Y. Scott, William Andrews, E. G. McClure and John A. Schaulis, of Washington, Pa.

Leroy Gold Mining Company.—The main shaft is 185 ft. deep, and the vein is reported gaining in width.

Minnie May.—Thomas Dixon has sold this group, 3 miles west of Custer, to Eastern parties for $30,000, the purchase money having been deposited in the bank.

North Star Mining Company.—The stamp mill is idle and the company is experimenting to determining the most satisfactory method of treating the ore. The average value, according to mill run, is $10 a ton, but less than one-half is free gold, the rest being an iron sulphide that escapes.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Deadwood-Standard Gold Mining Company.—The last clean-up at the cyanide mill for January resulted in $6,000, making over $12,000 for the month.

Golden Reward Company.—Operations are suspended, owing to a strike of the smelter men, who walked out, owing to the refusal of the superintendent to keep a helper to the men on the feed floor. The management closed the mines, putting nearly 1,000 men out of work. Unless a settlement is reached the company proposes to ship to outside smelters.

Hogan & Anderson Group.—Edward Hanschka, a member of the Deadwood-Standard Gold Mining Company, has purchased the gold property of Samuel Hogan and Leonard Anderson.

McLaughlin Group.—J. D. Sheehan, of Galena, lessee, is shippnig to the National Smelter at Rapid City. The ore is auriferous pyrite, valuable as a flux.

Pennsylvania Mining Company.—A steam hoist has been ordered for the 2-compartment shaft on Rutabaga Gulch.

Spearfish Gold Mining and Reduction Company.—The January run at the mill gave $32,000, the best the company has done. The ore averaged $7 a ton, against $5 for the best previous month.

Victoria Mining Company.—George S. Jackson, of Deadwood, superintendent, is in the East conferring with stockholders relative to the purchase of machinery for the cyanide plant to be built in the spring.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Cumberland Mining Company.—The drift on the 200-ft. level of the J. R. Mine has cut a vein of pyritic ore.

Gertie Mining Company.—The incline shaft is 500 ft. deep, and E. C. Johnson, superintendent, is preparing to drift on the vein.

Grantz Gold Mining Company.—The 2-compartment shaft at the St. Elmo Mine is nearly 200 ft. deep.

Rapid City Light and Fuel Company.—This company, recently incorporated by C. L. Wood, J. H. Evarts, George Schneider, Corbin Morse, T. J. Elliot, A. J. McCain and G. S. Congdon, prominent men of Rapid City, S. D., intends to bore 3,000 ft. for oil.

Sunbeam Gold Mining Company.—The shaft is 200 ft. deep, following the free milling ore. Much of the ore shows free gold. Machinery is on the ground for a 10-stamp mill, which will be built as soon as water can be obtained.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Shipments.—The Salt Lake banks make the following reports for the week ending February 6: Bullion, $188,700; gold, silver, lead and copper ores, $188,900; gold bullion, $126,600; total, $504,200.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—The samplers report the receipt of the following shipments: Bullion-Best, 8 cars; Mammoth, 18 cars; Eagle & Blue Bell, 5 cars; Star Consolidated, 2 cars; Showers Consolidated, 1 car; Grand Central, 21 cars; Yankee Consolidated, 5 cars; Lower Mammoth, 2 cars.

Carisa.—The connection between this company's ground and the Sioux-Ajax tunnel near Tintic is completed. This avenue is expected to save 35c. per ton in handling.

Mammoth.—The mill is now idle, but about 100 men are still employed in development, and in shipping the ore that has the $1.50 tariff.

Snowflake Company.—Ores are now being raised from the new find, and a shipment is expected soon.

Victor-Boss Tweed.—The Boss Tweed Company has invited the shareholders to meet on March 10 to consider consolidating its holdings with the Victor Company, its neighbor. The Victor Company will have its meeting somewhere near the same time. The basis of consolidation will probably be a new company, and share for share to holders in each company.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

United States Mining Company.—For January this company shipped East 842,800 lbs. of copper bullion carrying gold and silver, the product of 3 furnaces. With 4 furnaces now in operation the company is reported handling 1,000 tons of ore every 24 hours. It is announced that the company is preparing to handle custom ores as a competitor of the American Smelting and Refining Company and the Bingham Company. This will, it is said, necessitate the early starting of the company's fifth furnace, and may result in the building of a sixth furnace, the foundations for which have been built.

Smelter Fumes.—What is known as the Barnes Bill is violently opposed by the smelter men, who say that to comply with its object is impossible. It orders the smelters of the Valley either to consume the fumes or abate the trouble somehow. The measure will probably be defeated.

Boston Consolidated.—This Bingham property has been sampled by Ralph Nichols for his London principals. He has returned to England. It is expected he will recommend the construction of a smelter.

Highland Boy Smelter.—Shipments for the week ending February 6 were 5 cars of copper bullion approximating 300,000 lbs.

United States.—T. R. Jones, so long connected with the Germania Smelter, has been induced to take charge of the custom department of this company's plant. The shipment for the week ending February 6 was 181,530 lbs. copper bullion.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Park City Shipments.—The Mackintosh Sampler reports the following receipts for the week ending February 6; Daly West, 1,880,980 lbs.

Quincy.—Ore hoisting has been resumed and the damages caused by the recent snowslide are repaired.

UINTAH COUNTY.

Gilson Asphaltum Company.—This company, at Price, will try and break its biggest record this month in shipments from the gilsonite deposits to the east of Fort Duchesne. For two days of the month over 500 tons of the first-grade stuff has been broken down, and is on the dumps. The Placer Mining Company, at Soldier Summit, the Pariette, out near the reservation, and the Raven Company, the latter working on a lease from the Indians, will each have an output of a car-load of gilsonite and elaterite for February. All are handicapped in their outputs from the heavy snows and bad wagon roads.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Stockton Shipments.—The Cygnet reports 2 cars, and the Ophir Hill 6 cars for the week ending February 6.

Honerine Tunnel.—This long drain tunnel is now in 3,240 ft., and is soon to beat the half-way station. Work is advancing as fast as possible.

Sacramento.—This company has declared a ½c. dividend, or $5,000, which makes $10,000 since January 1. As to treat the mercurial ores the retort has been placed in experienced hands familiar with such work. The results so far have not been up to the capabilities of the plant or mine.

Utah.—This mine at Fish Springs shipped 2 cars of ore for the week ending February 6.

WASHINGTON COUNTY.

(*From Our Special Correspondent.*)

Utah & Eastern Mining Company.—According to J. E. Beveridge, the company's consulting engineer, the new smelter near St. George will be ready to blow in by February 25, with plenty of ore in sight.

VIRGINIA.

WISE COUNTY.

Virginia Iron, Coal and Coke Company.—During the past 5 years 2,200 coke ovens have been constructed in Wise County, one-third of which are owned by this company.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

American Flag.—Work is temporarily suspended, and the ore broken in driving the tunnel—15 to 20 tons—is being hauled to the railway for shipment.

California.—This Republic mine shipped 3 car-loads of average grade ore February 4. Twenty men are employed. The 500-ft. shaft is being repaired preparatory to sinking another 100 ft. The company may install an air compressor, power drills and a larger hoist.

Quilp.—In the winze, between the Nos. 4 and 5 levels, the vein has been cross-cut 23 ft. No precise information can be had. During the week ending January 31 15 car-loads of ore, upwards of 400 tons, were shipped to the Granby Smelter.

Rainbow Group.—The owners, who reside in Minnesota, will let a contract to drive a tunnel 270 ft. to cross-cut the vein. Last summer a large body of ore was opened near surface.

Zala M.—This Republic mine has shipped another car-load of ore to the smelter.

San Poil.—Work at this Republic mine is suspended temporarily on account of an explosion of gasoline, used for the hoist.

Summit Mining and Milling Company.—Judge C. H. Neal, of the Superior Court, is president. The other trustees are H. R. Alexander, C. A. Gray and S. C. Chezum, Davenport, Wash., is the principal place of business. The company has 1,000,000 shares, at a par value of $1 each and non-assessable, with 400,000 shares in the treasury. The company owns a group of 5 claims near Keller, 45 miles south of Republic. A ledge, traceable for 3,600 ft., is from 5 to 7 ft. wide. A shaft is down 92 ft. Four men are employed. The ore is said to average $65 per ton in silver and copper, and to carry a small value in gold.

OKANOGAN COUNTY.

(*From Our Special Correspondent.*)

Belcher.—The red tunnel is in 240 ft., and has cut good looking sulphide ore, showing copper. In the upper workings the face of the drift is in ore that averages $35 per ton, mostly in gold, but carries copper and a little silver.

Ben Harrison.—It is reported that a smelter will be installed for this and adjoining mines situated due west of Chesaw.

Bodie.—The blacksmith shop at this mine at Bodie was recently blown to splinters by dynamite that had been left to thaw on a shovel. The mine is temporarily closed, and contracts will be let for the next work.

Grant Group.—Some very rich copper ore has been discovered in this Chesaw property. A bond to W. T. Mendenhall has been renewed.

Horn Silver Mining Company.—This company has 4 claims on Palmer Mountain, between Wanicott Lake and the Similkameen River; also a mill site. Two shafts have been sunk. One, an incline, follows an 18-in. pay streak, averaging $60 per ton at 8 ft. depth. The other shaft, vertical, is down 40 ft. in the hanging wall rock, and cuts a stringer 12 in. wide that averages $101 per ton. A 500-ft. tunnel intersects the vein 157 ft. deep, developing a pay streak on the foot wall 27 in. wide that averages $215 per ton. A pay streak in the center of the vein is 24 in. wide and averages $40 per ton. The ore runs in gold, silver and copper. Several tons have been sacked, and some is being dumped in ore bins to await railroad transportation to the smelters. The only present way to ship is by wagon, via Brewster, on the Columbia River, 50 miles distant. For three months, during springtime and high water, it can be sent down the Okanogan River to the Columbia.

Meteor.—A body of $40 ore has been encountered 25 ft. deep in a new shaft, 400 ft. from the old workings. New buildings are being erected.

Stray Dog.—This claim shows some very good ore.

Myers Creek Smelting and Milling Company.—The nominal capital is $1,000,000. The trustees named are T. H. Robb, F. L. Woodbridge, W. C. Peary, M. A. Glenn, P. A. Anderson, O. E. Kinseley, of Ohio, and J. P. Blaine, of Chesaw. Five acres of land, including valuable timber, has been secured. A saw mill has been purchased and machinery is to be ordered.

Opal.—This property in Chesaw District is under bond. A shaft is being sunk on the vein, and a 300-ft. tunnel driven to connect with it at a depth of 125 ft. The superintendent reports the discovery of rich ore.

Security Gold Mining and Milling Company.—Miners are busy in the tunnel in 70 ft., following a 4-ft. vein of good gold-bearing ore.

Six Eagles Group.—Six claims cover different veins on Palmer Mountain, ¼ mile above the Similkameen River. On the Eagle No. 1 is a 7-ft. vein that assays $9 or $10 in gold and silver, and carries lead and iron-copper sulphides. A shaft 100 ft. deep follows the vein. On the Ohio claim a ledge has been struck 15 ft. wide, with average values in gold, silver and copper of $17 per ton. Nine men are driving a tunnel to get under a shaft now down 250 ft. on a 5-ft. vein. The tunnel is equipped with a 30-h.p. boiler, an air compressor and machine drills. Ohio people are having the property surveyed and examined, with a view of purchasing. Survey is under way for an electric tramway to a large tract of land at the falls on the Similkameen River, 6 miles distant, where a reduction plant is contemplated.

Strawberry.—Work at this Chesaw property will continue all winter.

Wyandot Mining Company.—A horse whim has been installed and a contract let to sink the shaft on the Oregon Mine to 100 ft.

STEVENS COUNTY.

(*From Our Special Correspondent.*)

Old Dominion.—The manager has gone to Minneapolis, Minn., to consult with his company. A carload of ore is shipped per week, reported to average over $2,000 net per car.

WEST VIRGINIA.

MERCER COUNTY.

Elkhorn Coal and Coke Company.—A. D. Robertson, of Shamokin, Pa., and W. W. Robertson, of Mt. Carmel, Pa.; A. Barlow, E. Barlow and Mrs. Barlow, of Mahanoy City, Pa., have relinquished their holdings in this company for a consideration of more than $350,000, the purchasers being a New York syndicate. The Elkhorn company controlled a large tract of land very near to that owned by the Shamokin Coal and Coke Company, and had an excellently equipped plant for the mining of soft coal and 150 ovens for burning coke. The above mentioned people have worked the land for 16 years, and there yet remains 13 years of the lease.

Winona Coal Company.—This company, capitalized at $125,000, with headquarters at Pulaski, Va., has leased from the Norfolk & Western Railway Company 1,500 acres on Wide Mouth Creek, and will shortly begin operations. The officers of the company are Capt. D. H. Barger, Montgomery County, president; Col. H. E. Harman, Pulaski, vice-president; Mr. C. G. Larew, Pulasik, secretary and treasurer.

WISCONSIN.

SAUK COUNTY.

Illinois Iron Mining Company.—The present shaft is 300 ft. deep, the drift about 230 ft., and the cross-cut is operated in over 60 ft. of good ore.

Old Dominion Iron Company.—This company of Baraboo have been organized with a capital stock of $60,000, the incorporators being Evan A. Evans, H. H. Thomas and E. J. Rooney. The company will mine iron ore in the North Freedom iron district.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

(*From Our Special Correspondent.*)

Camp McKinney District.—Work at Camp McKinney during 1902 was restricted chiefly to the Cariboo-McKinney Mining and Milling Company's Cariboo Mine. Quite lately some activity has been shown in connection with the further development of the Waterloo, but difficulties, first in connection with the organization of a new company to acquire the property from the old Waterloo Company, and later from insecurity of title to the mineral claim, prevented much progress. Now, however, more energy is shown in opening up the shoot of rich ore met at the 160-ft. level. A more powerful hoist has been purchased and shipped in from Spokane, and it has been decided to sink another 100 ft. before the surface water becomes troublesome in the spring. Prospecting on several other properties in the camp, but no important developments have yet been reported. Three or four miles southeast of Camp McKinney are the Dayton, Dewey, Jim Crow, Night Hawk and other claims situate on the divide between the main Rock Creek and the south fork of that stream, upon which surface prospecting has disclosed the presence of big bodies of mineral that give promise of being worth open.

SOUTH AMERICA.

BRITISH GUIANA.

The Mines Department reports the production of gold in December, on which royalty was paid, at 12,940 oz. In December, 1901, the total was 12,588 oz.: showing an increase in 1902 of 352 oz., or 2.7 per cent.

MINING STOCKS.

(Full quotations are given on pages 282 and 283.)

New York Feb. 10.

There is a decidedly better tone in the copper share list, owing principally to an improved metal market. Some people attribute the rise in prices to an early settlement of differences between the larger companies, but such talk is always prevalent when the stock market takes an upward turn.

It is of interest to remark that attempts are being made to establish a Boston copper share market on the New York curb, and already sales of some of the best stocks in the list are reported. Calumet & Hecla, of Michigan, appeared on curb on February 9 at $549@$550, when a $5 quarterly dividend was declared. This is the same rate paid in the three previous quarters, being equal to 100 per cent annually on the par value of $25, and making the total dividends to date $80,-300,000, on a capital of $2,500,000. On February 6 Tamarack sold at $178@$196; Osceola, $72@$74, and Utah Consolidated, $31⅞@$32. The latter stock is largely held in New York, and is paying good dividends. Parrot, of Montana, controlled by Amalgamated, made a sale at $32. In the regular list of curb coppers, Tennessee holds an important position. Its sales have been large, and the price of the stock rose on February 9 to $30⅛, while par is $25. This advance is due to the excellent showing of the property last year, when net profits were $231,109. Some business has also been done in United, of Montana, at $30@$26¼, and in Greene Consolidated, of Mexico, at $21¼@$22½. British Columbia Copper is not strong, selling at $6@$7. The company reports available assets on November 30, 1902, of $84,193, while accounts and bills payable stood at $133,738. The mining property and smelting outfit are valued at $1,554,039, from which should be deducted $294,-039 for depreciation. There is held in treasury $39,-545 stock of the $1,250,000 capital. White Knob, of Idaho, brought $11½@$12¼.

On 'change Amalgamated Copper is in better form, and advanced to $71 on February 10 on large sales. Anaconda is sympathetically strong, rising to 114¼ per cent ($28.56), the highest point in a long while.

Homestake Gold, of South Dakota, sold 104 sales at $64, which is the first transaction since November, 1902, when $65 was paid. Taking monthly dividends at 25c. per share, the price of $64 yields nearly 5 per cent annually.

Ontario Silver, of Utah, after selling 10 shares at $5.75, the lowest in months, rose to $6.50. The fluctuation was due primarily to the weakness in the silver market. Daly, in the same State, appeared at $4.

The Comstock stocks continue to attract attention, but most of the dealings are among room traders. Ophir touched $2.50, then receded to $2.25, as a 15c. assessment is being collected. Consolidated California & Virginia gained 15c. at $2.15, but deducting the current assessment the price stands at $1.90. Confidence is bringing $1.25. Union Consolidated is supported at $1.20@$1.25. Other shares are fluctuating to a moderate extent.

In the Colorado list the Cripple Creek shares are most in favor, though prices are weak. Portland is down to $1.30, the lowest in a long while. Isabella hangs at 25c., while Elkton Consolidated sells at 38 @37c.

Colorado Springs. Feb. 6.

(From Our Special Correspondent.)

The mining stock market is showing considerably more strength these days than for some time past. There are unmistakable signs of better things. While the stocks on the public board have been gradually stiffening, the most marked improvement has been among the mines which in turn has brought about a more favorable state of affairs. The brokers are talking in a much more cheerful tone, something which is a decided novelty in local mining circles. The market is in better shape than it has been at any period for the past 18 months.

Trading this week was transferred from the Beacon Hill prospects to the mines list. C. K. & N. had a weak spell, selling from 20½ and 20¾ down to 18½c., but recovered to-day to 20⅜@20¾c. El Paso weakened from 68½ to 67c. during the past seven days, due to water conditions in the lower levels.

Elkton sold at 37 on the opening of the week up to 38, and back to 36c, to-day. The stock fluctuated with the market and lost in price sympathetically with other leaders. Golden Cycle sold last Saturday at 7C, but starting anew February 2, gained in strength, selling up to 76¼c. to-day. The annual meeting has just been held in Denver, in which the Millikin-Hill faction voted the control of the stock, thus returning themselves to power. The minority was given two out of the five directors. The appreciation in the values was due to the action of the board of directors in increasing the monthly dividend from 1c. a share to 1½c., making the disbursement $22,500 every month.

Portland was a disappointment this week. The stock declined from $1.65 to $1.45 this week, and closes in poor shape. The annual report shows that the gross production of the mine for the year was $2,334,023, and the net earnings $471,919; total production to date, $15,472,549. President Burns in his annual address corroborated the exclusive announcement made in this letter several weeks ago that the mill at Colorado City was in need of a general overhauling. He recommends the rebuilding of the roasters and general going-over of the entire mill. There is no question but what the mill will be sucessful if the right kind of managers are put in. The JOURNAL'S exclusive news regarding the state of the Portland mill has enabled its readers to keep abreast of what was transpiring and to profit thereby.

Vindicator sold more freely this week than for some time past, 6,100 shares going at $1.05. The annual report of this company issued January 25, showed a good state of affairs, so that the selling cannot be laid to that score. What is more probable is that some Vindicator stockholders who are also Golden Cycle stockholders are disposing of their interests in the former company in order to acquire larger holdings in the latter, whose stock is selling at a lower figure while earning a larger per cent of dividends.

The prospect department was quiet this week, although some activity was noted in Old Gold, Marquette, Magnet Rock, Pelican, Silver, Gold and Texas Girl.

Boston. Feb. 10.

(From Our Special Correspondent.)

A week's time has wrought many changes in mining shares, and the most sanguine would not have believed that such extreme fluctuations could take place in so short a time. Bullish enthusiasm has been thoroughly aroused, and brokers' offices are crowded during the market hours. Of course, there has been a decided tendency to take profits, and many tired holders of copper shares are commencing to see daylight after carrying stocks along for years. Monday was almost the largest day the Boston Stock Exchange ever had in volume of business, and the greater part of it was in coper mining shares. This speaks volumes, and without doubt a crazy bull market for these issues is on with no signs of abatement. On the contrary, brokers predict that a bigger market than Boston has ever seen will come along before spring, and prices will soar much above those prevailing. Buy orders are reported in almost all stocks under the market, and this is a healthy sign. The makers of the market have certainly put things in excellent shape, and are not ready yet for the killing.

It is said that New York has been making this market, but if the true facts were known they might show that the business is inspired from this center. The extreme quietness of Lawson is commented on, and the only remark heard is that he is sawing wood and has no time to talk. It is talked from excellent sources that the metal will go to 14c. by spring, and may eventually touch 15c.

Osceola one day last week jumped at $7.50 to $76 per share, and subsequently touched $79. The next day Tamarack jumped up $24 per share to $176, and the following day rose to $190. These stocks close $3 and $4, respectively, below the highest prices. Copper Range, which has been slow, pegged up $6.50 to $72.37½, reacting but $1.25. United States has been another prime favorite, having risen $2.62½ to $27.50, with less than $1 reaction. Centennial has been heavily traded in up to $31.75, with the final to-day $5.25 above a week ago at $31. Bingham has gone up $5 to $39.50, reacting to $38.75. Atlantic spurted $5.12½ to $14.12½, reacting to $13.25; Parrot, $4.25 to $34, reacting to $33.50; Trinity, $3 to $14, losing to $13.50; Franklin, $3.75 to $14, losing to $13; Mohawk, $5.25 to 58.25, losing to 57.50; Shannon, $3 to $14, losing to $13.50; Isle Royale, 5 to $17.50, reacting to $17; Old Dominion, $3.25 to $23.25, reacting to $22, and Winona, $2.25 to $10, reacting to $9.87½.

Of course, it cannot be denied but manipulation has been a prominent feature in these wide changes, but prices do not react much, and the buying power is as fresh as ever on the reactions.

Calumet & Hecla's $5 dividend had no effect, as it is expected the next one, three months hence, will be larger. This stock rose $30 to $550, losing but $10; Quincy rose $16.50 to $126.50, losing but $2.50, and Trimountain rose $7.50 to $99, reacting $1.50. Utah has been active, but has not shown the buoyancy of other stocks. It rose $1.25 to $33, losing to $32. The activity spread to the cheaper class, including Allouez up to $6.50; Arcadian, $6.12½, and Elm River, $4.37½; Adventure advanced $2 to $16.25, reacting to $15.50, and Mass, $2.25 to $18. Dominion Iron and Steel was raided down $5 to $50.50, with recovery to $52.75. It is supposed to have come from Montreal. Michigan mining touched $11.50. A $1 assessment is looked for in the spring to build a mill. A dividend for United States Mining is talked for in the early summer. A report will soon issue. The Allouez will begin at once to sink a vertical shaft for the Kearsarge lode.

Salt Lake City. Feb. 6.

(From Our Special Correspondent.)

With the advent of a new list of officers on the governing board of the Exchange is seen the reappearance of several of the traders not on the list, which appear during the open board session. Among them are the Franklin, which is started off at 50c. per share. This week the regular call advanced in strength, and prices were on the rise. The amount of business was larger than the previous period. Among those registering gains were Ajax of Tintic, 2,900 at 30@27c.; California, 23,500 at 29@26½c.; Daly, 3,396 at $4.50@$3.40, an advance almost of 1. Daly-West sold as high as $40.68, and opened at $39 low; sales were 1,105. Daly-Judge was pushed down the line from $10.37½ to $10.10, with sales of 2,070 shares. The remaining list is unchanged and the business for the week amounted to 206,465 shares, which brought $119,367.

San Francisco. Feb. 7.

(From Our Special Correspondent.)

The market has shown many fluctuations during the week. Slight falls on profit-taking followed by gains on fresh buying have been the rule, Upon the whole, the tendency has been downwards; but the public seems to be taking a good deal of interest still.

Some quotations noted are: Ophir, $2.55@$2.70; Caledonia, $2.35@$2.45; Consolidated California & Virginia, $2.05@$2.15; Mexican, $1.80@$1.95; Hale & Norcross, $1.40@$1.45; Sierra Nevada, $1.05@$1.10; Gould & Curry, 90@95c.; Overman, 70@75c.

Business in oil stocks, which was very good in the earlier part of the week, quieted down at the close. Prices remained firm, however. Peerless sold at $15@$15.25; Kern, $5.75; Sterling, $3@$3.10; Twenty-eight, $2.70; Sovereign, 40c.; Reed Crude, 33c.; Independence, 13c.; Lion, 10c. Reed Crude and Lion were special favorites in the prospects.

COAL TRADE REVIEW

New York, Feb. 11.

ANTHRACITE.

Most of the independent operators who a month or so ago broke their contracts with the anthracite roads, and started to make all the money they could by asking as high prices as the market would stand, have concluded that the weather is against them, have made peace with the railroads and renewed contracts which allow them 65 per cent of the tidewater selling price. The firms which handled independent coal, though as able as any in the trade, had not a clientele sufficient to take all the coal offered, and had not time to work up a larger business. Also commissions demurrage charges and embargoes damaged the luscious profits that tempted the independents. When one comes to think of it, however, the independent operator who sells his coal on a basis of 65 per cent of the present tidewater price of $5 ought to be satisfied. The market is large enough to take all the coal he can mine, and once he has delivered the coal to the railroad his troubles are over. He ought just now to be making money hand over fist.

The Anthracite Commission has heard all sorts of evidence, and also from miners' attorneys some very windy eloquence intended not to influence the Commission, but to influence votes. As to what the decision of the Commission will be, one man's guess is probably as good as another. There seems to be a pretty general belief that the Commission will decide for an increase of wages of 10 to 15 per cent, and possibly for a 9-hour work day. The real issue before the Commission however, is that of union methods; are the mine operators or an irresponsible body of ignorant men to decide who shall work and who shall not at each mine. It seems hardly possible that the Commission will reach a unanimous decision on this all-important subject.

Though demand along the seaboard has fallen off under milder weather and very heavy shipments at interior points the demand is still strong. Points in Lake Superior territory will get little anthracite before lake navigation opens. In Chicago territory arrivals of all-rail coal are bound to increase as the railroads can reduce shipments to seaboard points. All-rail arrivals during the past week, however, have been slightly less, owing to storms delaying coal in transit, but the effect on the market was only temporary and present conditions favor an easier market. Along the lower lakes and in Canadian territory there is an active market for anthracite, and receipts are increasing. The same is true of interior points in New York and the New England States. At Boston speculative prices have taken a big slump, and domestic sizes are offered at $6, f. o. b. At New York Harbor independent coal is held by speculators, has been offered at $5.50@$5.25, but finds few takers as a plentiful supply of $5 coal is available, only a blizzard will send prices up so long as the operators rush production as at present. The steam sizes are

more abundant, and pea, f. o. b. New York Harbor shipping port, is offered at $3.85, buckwheat $3, buckwheat No. 2, $2. Retail prices at New York are below $7 for domestic sizes.

BITUMINOUS.

The Atlantic seaboard soft coal market continues to feel the effect of large importations of English and Scotch coal, and conditions are much quieter than a few weeks ago. The speculative price has fallen to $4.10 for Clearfield grades, f. o. b. New York Harbor shipping ports, and may fall to below $4 before the end of the week. As regards domestic producers, the situation has not changed much, car supply being poor and the railroads confiscating much coal in transit.

In the far East so much foreign coal has arrived at Boston of late as to shut off all demand for domestic coal, except what may be due on contracts. Along Long Island Sound trade conditions are much quieter than two weeks ago, and the market has lost all feverishness. Demand at New York Harbor points just now is as strong as in any other consuming territory. It is said that the reason why several transatlantic lines were delayed for a day or so last week was not because of any actual shortage of coal in sight, but because the company having the contracts to supply the vessels did not care to buy coal readily available, preferring to wait for a supply from its own mines. In the all-rail trade coal is in better supply than a week ago and practically all consumers are getting enough to keep their plants in operation.

Transportation from the mines is irregular, but generally coal runs through to tidewater in about a week. Shippers try to make up for irregularities by keeping fair tonnages ahead. Car supply at the mines ranges from 25 to 35 per cent of the demand, and as coal seized by the railroads comes out of the amounts shipped, there is much complaint from producers.

In the coastwise vessel market, vessels are fairly plentiful, and with fair weather for a few days rates are likely to fall. We quote current rates as follows: Philadelphia to Long Island Sound ports, $1; to Boston, $1.25; New York to Long Island Sound ports, 75c.; to Boston, $1.

Birmingham. Feb. 9.

(From Our Special Correspondent.)

The local demand for coal is heavy, while shipments to other points are not decreasing. Alabama coal is going north still, and the mining corporations have been receiving inquiries.

During the past week the following coal companies filed incorporation papers in Jefferson County: Warrior River Coal and Land Company, capital stock, $30,000; Upper Cahaba Coal Company, capital stock, $50,000; Bradford Coal Company, capital stock, $10,000. Each of these companies will open mines and in a short while be putting coal on the market.

The work of further development by the Lehigh Coal Company in Blount County, has commenced. Mr. John A. Rutherford, of New York, the vice-president of the company, has been spending considerable of his time in this section lately, and he asserts that as soon as the Louisville & Nashville Railroad will build the mile extension track which is needed, and the contract for which has already been given out, the output at Lehigh will be increased from 500 to 1,000 tons of coal daily.

The official report as to the output of coal in Alabama during the year 1902 has been given out by State Mine Inspector J. deB. Hooper. The report shows that during last year the total was 10,327,713 tons, against 8,970,617 tons in 1901, showing an increase of 1,357,096 tons. The official report shows that 17,589 men were employed in various capacities in and about the mines last year, 12,156 of them in the capacity of miner. The report as to the output by counties is as follows: Jefferson, 5,899,973; Marion, 65,068; Shelby, 126,070; St. Clair, 155,172; Tuskaloosa, 426,786; Nibb, 1,455,794; Blount, 21,217; Etowah, 101,557; Cullman, 168,893; Walker, 1,851,079; Winston, 28,104; smaller mines, estimated, 30,000; grand total, 10,327,713.

Chicago. Feb. 9.

(From Our Special Correspondent.)

On account of the comparatively mild weather that has prevailed, with brief exceptions, the wholesale coal market is not brisk. There is an additional cause for this condition, in the fact that the railroads are doing much better than they did a month ago, hauling coal to market; on all the important lines coal is being classed with perishable goods in importance, and the consequence is naturally a much better supply than existed a month ago. This state of things characterizes the market for Western coal. Eastern grades are still scarce, and the price has not declined so perceptibly on them as on Western bituminous. Of course, anthracite is out of the question yet, the only supply being by rail and the production of the mines insufficient to meet the demand caused by the long strike. What little anthracite comes in is retailing at $10@$12. The wholesale price remains at $7.50. Smokeless grades remain practically the same in price; $6 is being asked to-day for Pocahontas and Maryland, but the supply is limited, and there is difficulty in assuring anything like prompt delivery of new orders. Hocking is quoted at $5.50, and is perhaps first in demand; West Virginia and Pittsburg sell at $5.25; Indiana and Illinois lump and egg bring $4. These prices are, of course, 50 to 80 per cent higher than those normally prevailing at this season.

Much coal is being distributed to the poor of the city through the charitable organizations and the city coal yards, at wholesale prices for small lots, or ton retail prices for basket lots. This distribution has not materially affected the regular trade, and has been substantially aided by many large dealers. All the coal distributed in this way is bituminous, from Illinois mines chiefly.

There seems little probability that prices will go higher than they are now, with winter two-thirds gone and the supply apparently permanently improved.

Cleveland. Feb. 10.

(From Our Special Correspondent.)

The coal shortage in this territory might be said to be completely relieved for the time being. How long this situation will continue is another question. The railroads by almost superhuman effort and by depriving all other shippers of many of their rights have succeeded in giving the entire district an adequate supply. The yards here are so full that it is only a question of delivery. Embargoes, by means of which geenral freight has been kept out of the way of coal and coke, are being lifted with the possibility that soon a worse congestion than ever will have the territory in thrall. The worst difficulty seems to have been to keep a supply of coke on hand for the furnaces and foundries. The price of this material is now soaring and many of the consumers here have been offered coke at from $7 to $7.50 at the oven, and a few of the foundries have said that they would go out of business before paying it.

The coal carrying railroads are holding a meeting in Pittsburg this week to fix the rates on coal to the lakes during the coming season of navigation. It is understood that they intend an advance of from 7 to 10 per cent. As soon as this meeting has been held the coal operators will hold a meeting at Cleveland to decide upon the prices for the ensuing year, and after their sales have been made the lake rates for the ensuing year will be discussed. It is said now that the vessel owners will ask 50c. between Duluth and Ohio ports.

Pittsburg. Feb. 10.

(From Our Special Correspondent.)

Coal.—The mining rate having been fixed at a stiff advance over the prevailing scale, contracts for coal for delivery after April 1 will be at a much higher figure. Some contracts for the Northwestern trade are said to have been placed, but the price was contingent on the new mining rate. The joint conference of operators and miners at Indianapolis closed last Saturday, when an agreement was reached granting the miners an advance of 12½ per cent for pick mining, and a somewhat greater increase for machine miners. Wages of mine workers and drivers were also increased in some cases as much as 22 per cent. Reports show that not more than 12 per cent of the capacity of the mines in the Pittsburg District was produced last week, owing to the lack of railroad cars. All the mines weer well supplied yesterday, and are in operation, but it is doubtful if enough empties can be furnished to keep them running all week. The Monongahela River Consolidated Coal and Coke Company sent out nearly 4,000,000 bush. of coal during the past few days. It has a large number of empty coal boats and barges, and the mines are running steadily. A meeting of presidents and traffic managers of the railroads is scheduled to be held here on February 16 to consider the advance of soft coal rates.

Connellsville Coke.—Shipments for the past two weeks have been bad, but there was an improvement late last week, and the supply at the furnaces in the Valleys yesterday was nearly normal. Fancy prices are being paid for prompt shipment. Furnace coke is selling at $3.50@$4.25, and foundry at $5@$6.50. The *Courier*, in its last issue, gives the production for the previous week at $239,886 tons. The shipments were 9,321 cars, distributed as follows: To Pittsburg and river tipples, 3,902 cars; to points west of Pittsburg, 4,228 cars; to points east of Connellsville, 1,131 cars. This was a decrease of 952 cars.

San Francisco. Feb. 7.

(From Our Special Correspondent.)

The coal market continues quiet. Arrivals are sufficient to meet all demands, and prices show no change.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present entirely nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $9; Brymbo, $7.50; Wallsend, $6.50. There is no Eastern anthracite on hand, and Cumberland is rather scarce.

Foreign Coal Trade. Feb. 11.

Export trade continues quiet, and very little new business is reported. Imports of coal continue on a considerable scale.

Imports of coal and coke into Germany for the full year are reported as below, in metric tons:

	1901.	1902.	Changes.
Coal	6,297,389	6,425,658	I. 128,269
Brown coal (lignite)	8,108,943	7,882,010	D. 226,933
Coke	400,197	362,488	D. 37,709
Total	14,806,529	14,670,156	D. 136,373

The largest imports of coal—about 80 per cent of the total—were from Great Britain. Only 5,101 tons came from the United States. The brown coal was all from Austria. The coke came chiefly from Belgium.

Exports of coal and coke from Germany for the full year are reported as below, in metric tons:

	1901.	1902.	Changes.
Coal	16,266,267	16,101,141	I. 834,874
Brown coal	21,718	21,766	I. 48
Coke	2,096,931	2,182,183	I. 85,252
Total	17,384,916	18,305,090	I. 920,174

The heavier exports of coal were to Austria, Belgium, Holland and Switzerland; of coke to France and Austria. There were 2,807 tons reported shipped to the United States.

The coal production of Germany for the full year is reported as follows, in metric tons:

	1901.	1902.	Changes.
Coal mined	108,539,444	107,437,681	D. 1,101,763
Brown coal (lignite)	44,479,970	43,304,586	D. 1,175,384
Total mined	153,019,414	150,742,267	D. 2,277,147
Briquettes made	9,251,452	9,214,086	D. 37,366
Coke made	9,163,473	9,202,796	I. 39,323

Over 90 per cent of the total—100,260,529 tons of coal and 36,276,195 tons of brown coal—were from the mines of Prussia. The decrease was chiefly due to lighter demand from factories.

IRON TRADE REVIEW.

New York, Feb. 11.

More activity is noted in contracting for future deliveries. Some large sales of bessemer and basic pig are reported in the Pittsburg District for delivery in the second half of the year, and the Southern furnaces are beginning to contract freely for the same period. Reports that concessions would be made on such orders do not appear to be well founded, and the orders placed have been generally at present prices.

In steel billets the demand is large, and considerable sales have been made for future deliveries, both in bessemer and open-hearth brands. Foreign billets continue to be placed in the East, but none of this material is now being offered in the Pittsburg market, sales being confined chiefly to the seaboard.

In finished material the pressure for structural steel continues, and the market is more or less unsettled by the rush. As noted last week, the Bar Manufacturers' Association refuses to make any concessions on steel bars, and the result has been that a number of contracts which were waiting for the action of the Association, are now being placed. Upon the whole, the steel market may be said to be stiffer than it has been at any time during the year.

In the Pittsburg District transportation has improved slightly, and several furnaces in Pittsburg and the Valleys, which had been banked, have started up. West of Pittsburg, however, transportation is still in a chaotic condition, and manufacturers are making bitter complaints about the difficulty in receiving fuel and materials.

Birmingham. Feb. 9.

(From Our Special Correspondent.)

Consumers appear to be waiting for a decline in quotations while producers do not care to sell at reduced prices, feeling confident that the market can hold up under the strong prices which have prevailed. A few small sales are reported by brokers at off-prices, but in the general offices of the iron manufacturing companies the statement is made that while the buying is not as active as it might be, furnacemen can wait awhile, having sold pretty well ahead for the first half of the year. Shipments continue brisk and the indications are there will be no accumulation for some time, even if no more iron is sold.

The report gained a little credence during the past week that some No. 2 foundry iron had been sold at $18.75 per ton, delivery this year. A firm of young brokers announces that it did not actually place an order at those prices. It is stated, authoritatively, however, that $20 is being asked for No. 1 and No. 2 foundry, and that $20 flat is being asked for No. 2 soft.

There is not as much activity in finished iron and steel circles as was enjoyed a few months since. The demand is not so strong and the prices have not been keeping up with quotations for pig iron. As a consequence the rolling mill men in this district have not

been getting as much work as they can attend to.

There has been much wet weather in the district recently, and for a day or two there was some apprehension felt as to the raw material supply at the furnaces. This trouble is over now. No. 2 furnace of the Sheffield Coal and Iron Company has started to work again. The new furnace of the Alabama Consolidated Coal and Iron Company, at Gadsden, is not yet finished, and Col. Bush, president of the company, says that he does not desire to make a guess again as to when the furnace will be ready for active work.

The following quotations are given: No. 1 foundry, $20@$21; No. 2 foundry, $20; No. 3 foundry, $18.50 @$19; No. 4 foundry, $17.50@$18; gray forge, $17.50; No. 1 soft, $21; No. 2 soft, $20.

The statement is made in the Birmingham District that the Association agreement of furnacemen will be strictly adhered to, and that iron for delivery the first half of the year is to be at an average of $18.50, and after July 1 the minimum price for No. 2 foundry will be $18.50 per ton.

A positive announcement has been made that the steel wire, rod and nail mill of the Alabama Steel and Wire Company at Ensley will not be removed to Gadsden. Messrs. Schulers, of the company, are building a furnace at Gadsden and have intentions of erecting later on a steel plant there, too.

The foundries and machine shops in the Birmingham District still have a large amount of work on hand, and are giving steady employment to a large number of men. Work is being pushed on the new nut and bolt works at East Birmingham.

Chicago. Feb. 9.

(From Our Special Correspondent.)

Quietness still characterizes the pig iron market; sales are neither large nor small, considered as a whole. Prices remain substantially the same. No. 2 Northern is quoted at $23@$23.50 for the last half of the year, and $24@$24.50 for the last quarter of the first half; No. 2 Southern at $18@$18.50, Birmingham, for delivery in the second half, or $22.35@ $22.85, Chicago. For corresponding lots as regards time of delivery and amount, No. 1 is 50c. higher and No. 3 is 50c. lower than these prices, for both Northern and Southern. Spot or early delivery lots command an indefinite premium, ranging from $2 to $5, depending on the buyer's needs and the seller's luck in picking up such lots.

Coke is still scarce; there are several foundries shut down on account of inability to get it, and furnaces are running on short allowance, or closed. There seems no prospect of relief from the coke situation until May or June. Although the railroads are giving coal the right of way over everything else except perishable goods, coke is not classed as fuel, and is indeed held back by the rushing forward of coal. Coke is selling at $9.50@$10, the higher price being for Connellsville.

Cleveland. Feb. 10.

(From Our Special Correspondent.)

Iron Ore.—The ore producers of the Lake Superior region held another meeting here last Saturday to discuss prices, but arrived at no further definite conclusion, the principal matter under discussion being an agreement as to the amount of ore which should be produced during the coming year. Several meetings will still be necessary before the question is settled. The shipment of ore away from the lake stockpiles continues light, because of the crippled condition of the railroads, yet the furnaces are not suffering for want of ore. Very little is being said of ore freights other than the vessel men are now demanding $1 between Duluth and Ohio ports as a result of the prospective advance in the prices of ore, and some of the shippers have gone so far as to say that higher rates will be necessary this year.

Pig Iron.—The situation is distressing. The coke supply is quite limited on account of the car shortage, and this threatens to become worse instead of better. The Southern stacks are hindered from shipping iron into this territory, because of the railroad embargo and the furnaces have cannot supply the immediate demand. The spot buying is as heavy as the output will permit, and even then it is difficult to get the material moved. Those having material can get liberal premiums over market quotations. The forward buying of foundry is light, perhaps on account of a feeling among some of the consumers that the market is going off after April 1; but in this belief they are not altogether borne out by the previous sales. Foundry stacks are getting up fairly well on their old contracts, and are applying their output to this year's orders. The prices remain at $23 for No. 2 foundry, Valley furnace, for first half delivery, and $21 for second half, with spot iron of the same grade bringing $25 at the furnace. Southern iron is bringing $20, Birmingham. Bessemer iron is not active at all for several reasons. What material is being disposed of by non-association furnaces goes at $23 for first half delivery. Basic is off the market.

Finished Material.—The market this week is generally strong. The specifications on old contracts for structural material have been heavy, and it is beginning to be a question whether the needs of this territory will be met by the mills here. Some indication of this is seen in the number of consumers who are caught short on steel, and are bidding for it at premium prices, the amount demanded keeping the smaller mills busy and enticing some of the larger mills away from their contracts. The premium prices run from 1.75c. to 1.85c. at the mill. The standard price is still 1.60c., Pittsburg. The demand for bars has been heavier, and one sale of 1,000 tons of bessemer steel bars is reported. The bar iron prices are still a puzzle, as there have been no big queries to test the strength of the new agreement which, it must be confessed, was none too strong under its former administration. The price holds, however, as determined at 1.80c., Pittsburg, with some of the jobbers getting their proportionate advance on stock material. Bessemer steel bars are bringing 1.60c., Pittsburg, and open-hearth steel bars, 1.70c., Pittsburg. The smaller plate mills are filled up with orders at 2c. at the mills, and some of the larger mills have been asked to accept premiums, but have refused. The larger mills are well sold up, with heavy specifications coming in on old contracts. The association price is 1.60c., Pittsburg. Sheets are getting stronger, and the spring trade seems to be developing in the most satisfactory way, and with such vigor that there is not likely to be any serious over-production during this summer. While the prices have not advanced, there have been no reductions from the old scale, and underbidding for business seems to have stopped. The prices are still based on 3.10@3.25c. for No. 27, out of stock. The rail trade has been lively, with one transaction of 1,000 tons noted this week, and a good demand for light rails.

Philadelphia. Feb. 11.

(From Our Special Correspondent.)

Pig Iron.—Consumers of pig iron, especially of foundry who have considerable iron due them on old contracts, have within a short time received assurances from furnace people that deliveries of stipulated supplies will soon be made with promptness. Conditions at furnaces in Middle and Eastern Pennsylvania have begun to improve. While there is considerable friction in the delivery of fuel, the way is opening up and the furnace managers feel much pleased. Stocks at furnaces are low, as it is customary to make deliveries as quickly as possible. Stocks in foundry yards as to American irons are extremely light, and as to foreign iron, only a few consumers have what might be termed even a fair supply. Quite a number of foundry consumers have foreign iron due them this month and next, and importers stated to-day that they were ordering freely from the other side. There is no change in quotations, and buyers of iron are still anxious to place contracts wherever they can where there are assurances of anything like early delivery. Certain large consumers of pig iron who are figuring on work are between two fires as regarding cost of iron they may need and the getting of it when wanted. Foreign iron shows an upward tendency, and American iron certainly shows no downward movement. Quotations for No. 1 foundry range from $24 to $25; No. 2X foundry averages $22.50; best No. 2 plain sells at $22; gray forge, $20@$21; Middlesboro No. 3 in cargo lots is quoted to-day at $18, and Scotch from $20 to $21.50.

Billets.—Negotiations are again hanging fire on foreign steel. Foreign makers anticipate a heavy demand from this side and are disposed to sell in a small way. Latest quotation, $28. Home billets, $32.50.

Merchant Bars.—There is a perceptible increase in consumption of refined iron and steel bars, and there is no increase of production at mills. The larger consumers are complaining of delayed deliveries, but are not actually suffering. The mill men promise to make full deliveries by March. Quotations for steel bars in car-lots, 1.80c.; refined iron, 1.93½@1.98½c.

Sheets.—Those mills which are in a position to assure customers as to the certainty of delivery at fixed dates have booked several good orders this week at strong prices on the strength of this assurance. Nearly all consumers are anxious to buy sheet iron, but mill owners are difficult to bring to terms as to specific deliveries and quantities. They are not yet out of the woods as to fuel.

Pipes and Tubes.—A fair amount of business is being done.

Merchant Steel.—The time is close at hand when some of the big Eastern merchant steel users will place their orders. Negotiations which have been going on for some time have not been brought to a point because of the demands of buyers for what manufacturers regard as impossible concessions.

Plates.—The mill people say they have more business presented or within reach than they feel warranted in taking. Some very heavy business has been done. The situation is very strong. Fire box is 2.30c.; marine, 2.35c.; universals, 2c.; ¼-in. plates still hang close to 2.10@2.15c.

Structural Material.—Everything is in favor of the manufacturers. To attempt to estimate the amount of prospective business would be mere guesswork.

Scrap.—A great deal of quiet cutting is going on for heavy scrap, which amounts to bidding on the part of agents, for consumers. The cheaper grades of scrap are neglected.

Pittsburg. Feb. 10.

(From Our Special Correspondent.)

Buying of pig iron for second half delivery began during the week, and in addition to several sales a large number of inquiries have been received. It seems that uncertain freight conditions has been causing the delay in placing orders, but there is an improvement, and the railroads are removing the embargoes. The situation is somewhat better this week, and the outlook is decidedly brighter. The Pennsylvania Railroad Comapny made one of its greatest efforts from Saturday night until yesterday morning and succeeded in entirely relieving the congested condition in the Pittsburg District. The lines west, however, are not yet in as good shape as desired, but additional freight locomotives have been received, and the present prospects are that freight will move more easily in the future. Coke shipments last week and the week before were unusually bad, but during the last few days of last week and yesterday and to-day the shipments are about normal, and as a result a number of blast furnaces that have been banked are likely to be blown in before the end of the week. Reports yesterday indicated that but six furnaces in the Valleys were banked, and all in this district are in full operation. The coal supply for the mills here is better, and full production is being made. The flood on Friday interfered with the operation of several rolling mills along the rivers, but no serious delay was occasioned, and all were running as usual on Saturday.

The steel market is stronger, as both bessemer and open-hearth billets are hard to get, and prices are firmer. It was reported that fully 50,000 tons of open-hearth steel had been sold within the past ten days, but the report could not be confirmed. There is undoubtedly a heavy demand, but the principal producer is well sold up, and is asking much higher prices than have prevailed for a long time. No sales of bessemer billets are noted, and but little foreign steel is coming into this market. A heavy business was done within a week in steel bars and tank plate. As noted in the last issue the demand of large buyers of steel bars for a concession in price was refused at a meeting of the Steel Bar Manufacturers' Association. The former base price was continued for the year. Orders that had been held back in anticipation of a lower rate are now being placed for delivery throughout the year. There is no cessation in the demand for structural material, and a number of new orders have been booked. The tonnage placed during the week amounts to over 15,000 tons at the base price of 1.60c. A slight improvement is noted in sheets and tin plate, two weak lines, but there is not enough business to keep the mills in operation, and the majority of the independent plants are still idle. The wire market, another weak line, is gaining strength and prices are firm.

There is considerable talk as to what the United States Steel Corporation will do now that the courts have rendered a favorable decision regarding the proposed stock and bond conversion plan. If this plan is carried out the corporation will have $50,000,000 available for improvements and enlargements. Of this sum it is proposed to expend $10,000,000 in additional tube works at McKeesport. The sheet plant at that place also is to be improved. So far no definite action has been taken, although it is improbable that the case will be taken to the United States Supreme Court. No official announcement has yet been made as to what will be done with the newly acquired Sharon-Union properties. There is no doubt that the American Steel and Wire Company will take charge of the wire and wire nail plants, the Carnegie Steel Company, the steel and blast furnace plants and the American Tin-Plate Company will continue to handle the product of the tin-plate mills at Sharon.

Pig Iron.—Several sales of bessemer pig iron for delivery in the second half have been made at $21, Valley furnace. This is a higher price for larger lots than has ruled since 1899. About 10,000 tons were sold during the week for delivery extending throughout the year at prices ranging from $21.25@$21.50, Valley. Foundry No. 2 is still scarce, and quotations for early delivery remain at $23@$24, Pittsburg. About 4,000 tons were sold for delivery in the last half at $21.50, Pittsburg. Gray forge is quiet and continues to be quoted at $21, Pittsburg, for any delivery. This price might be shaded a trifle for a desirable order.

Steel.—The market is stiffer and open-hearth billets are firm at $31@$32, with bessemer billets about $1 lower. Orders for probably 20,000 tons of steel bars were placed during the week for future delivery at the base price of 1.60c. For early shipment a premium is asked. Fully 15,000 tons of plates were sold, the price being 1.60c.

Sheets.—There is a slight improvement in the market, but new business can be placed for early delivery. The leading producer is sold up for several months, but a number of independent mills that have a steel supply can take orders for prompt shipment. No. 28

gauge black sheets are still quoted at 2.75c., and galvanized at 75 and 10 per cent off, but on a good order an additional 5 per cent could be done.

Ferro-manganese.—Domestic 80 per cent continues to be offered at $50, and the foreign product brings about $1 a ton less.

New York. Feb. 11.

Pig Iron.—Some sales of fair size are reported to Eastern foundries, but most orders are for small lots. We quote for early delivery, Northern irons at tidewater: No. 1X foundry, $24.25@$24.75; No. 2X, $22.50@$25; No. 2 plain, $21.50@$22. For Southern iron on dock, New York: No. 1 foundry, $24.25 @$24.75; No. 2, $23.50; No, 3, $22.50. Middlesboro No. 3 pig is quoted at $18.50 in large lots, but for small lots and spot delivery, $20 is obtained.

Bar Iron and Steel.—We quote for large lots on dock: Refined bars, 1.95@2c.; soft steel bars, 1.80@ 1.90c.

Plates.—Demand is good and some very fair orders have been taken by Eastern mills. We quote for tidewater delivery in car-loads Tank, ¾-in. and heavier, 2.10c.; flange, 2.20c.

Steel Rails.—Mills are busy. Standard sections are still quoted at $28, f. o. b. mills for 1903 delivery; light rails, $30@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material—Demand remains good. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c. For small lots and prompt delivery premiums are paid.

CHEMICALS AND MINERALS.

(See also prices-current on page 284.)

New York, Feb. 10.

Trade is generally quiet, being confined to hand-to-mouth deliveries on contract. It is intimated that the sodas may be advanced, owing to expensive fuel, but as recent sales have been on a rather low basis, such increase will not be surprising.

It is gratifying to see by the annual reports of the larger chemical companies that profits in the past year have been good, notwithstanding competition and other circumstances. The General Chemical Company, which is an important factor in the industry, reported a net profit of $1,537,551 in 1902, which compares with $1,358,347 in 1901, and $1,258,946 in 1900. With an increase in profits the company has paid larger dividends, at the rate of 6 per cent on the preferred and 4 per cent annually on the common stock issued. On December 31, 1902, the company had a surplus of $1,615,473, which is nearly two years' dividends on the present outstanding capital stock. The Merrimac Chemical Company, of Boston, Mass., manufacturer of acids, etc., and one of the oldest concerns in the trade, has declared a semi-annual dividend of 3½ per cent, payable March 2.

As an indication of progress in the American chemical industry we note the erection of new plants and the remodeling and enlarging of old ones. Wherever convenient electrolytic processes are being installed to reduce the cost of manufacture to a minimum. Preparations are being made to double the capacity of the Erie Chemical Works at Erie, Pa. The Erie works are now manufacturing daily about 20 tons sulphuric acid of 60°. The improved plant will make 40 tons of this strength acid, and will be equipped so as to produce about 18 tons daily of 66° acid, besides hydrochloric and nitric acid.

The National Lead Company, owner of lead mines in Missouri and manufacturer of pigments, has called a special stockholders' meeting on February 19 to vote on amendments to the company's charter by making it perpetual and broadening its objects. Incidentally permission is to be given for the redemption of the $15,000,000 preferred stock at not less than par $100. This is believed to be the preliminary step to a consolidation with other manufacturers of lead products.

Heavy Chemicals.—Business is quiet. Few new sales are reported, deliveries being principally on contract. Prices are unchanged as follows, per 100 lbs.:

	Domestic, Prompt.	F. o. b. works. Futures.	Foreign. Prompt.	F. o. b. New York. Futures.
Alkali, high-test in bags	82½@85c.	72½@75c.	90@92½c.	.....
Caustic soda, high-test in bags	$1.90@$1.95	$1.65@$1.70	$1.90@$2.00	.....
Bicarb. soda, ordinary	$1.25	.....	$1.50@$1.60	.....
Bicarb. soda, extra	$3.00	.....	.....	.....
Sal soda	55c.	.....	67½c.	.....
Chlorate of potash	$7¼@$7½	$7@$7¼	$7½@$8	$7@$7¼
Bleaching powder, per quality	.....	$1@$1.25	$1.37½@$1.75	$1.25@$1.35

Cyanide of Potassium.—Imports are comparatively small at present, but domestic production continues at the rate of about 2,000,000 lbs. a year. Prices are easy at 20@21½c. per lb., f. o. b. New York.

Acids.—Some improvement is noticeable in deliveries on contract. Blue vitriol is firmer.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

Blue Vitriol	$4.87½@$5.00	Oxalic com'l	$5.25@$5.50
Muriatic, 18°	1.50	Sulphuric, 50°,	
Muriatic, 20°	1.60	bulk, ton	13.50@15.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.37½	Sulphuric, 60°,	
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°,	1.20
Nitric, 42°	5.37½	bulk, ton	21.00@23.00

Brimstone.—After several days' weakness when best unmixed seconds sold at $23.24@$23.50 per ton on spot, and $22@$22.37½ for shipments, the market stiffened. Cables report a firmer tone in the primary market, hence importers now ask $22.62½@$22.75 for shipments of best unmixed seconds and about $1.50 less for thirds.

Pyrites.—Consumption in the fertilizer acid trade is good, and prices continue firm. Recently a cargo of 3,785 tons Spanish iron pyrites arrived at this port. Ocean freights are now 10s. ($2.40) from Huelva, Spain, to Atlantic ports.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, $5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, $5, and fines, $4.75. Spanish pyrites, lump, 12@13c.; fines, 10@11c. per unit, delivered at New York and other Atlantic ports. Spanish pyrites contain from 46 to 51 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—The market is firmer. Spot is worth $2 per 100 lbs.; arrivals, $1.97½; March, $1.95; April, $1.92½; May, $1.90; June to December, $1.85. Freights from Chile are 13@14s. ($3.12 @$3.36). The Rosario Nitrate Company reports having manufactured and sold 1,456,000 qtls. (65,910 long tons) in the year ending September 30, 1902. The gross profit was £165,567 ($827,835), permitting the payment of an 8 per cent dividend for the year. In the previous year the output was 31,000 qtls. more than in 1902, or 1,487,000 qtls. (67,313 tons), while the gross profit was about £36,000 less, or £129,000 ($645,000).

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, Feb. 1, gives the following interesting statistics:

	1903. Tons.	1902. Tons.	1901. Tons.
Imported into Atlantic ports from West Coast S. A. from Jan. 1, 1903, to date	18,293	13,000	10,000
From Europe	.....	.....	.....
	18,293	13,000	10,000
Stock in store and afloat Feb. 1, 1903, in New York	165	6,100	866
Boston	.....		.....
Philadelphia	.....		.....
Baltimore	1,243		.....
Norfolk, Va.	2,524		.....
Charleston	2,853		.....
To arrive, due May 15, 1903	76,500	33,466	56,230
Vis. supply to May 15, 1903	83,285	39,566	57,096
Stock on hand Jan. 1, 1903	7,800	10,000	1,793
Deliveries past Month	19,308	16,722	11,298
Total yearly deliveries	.....	179,613	174,530
Prices Current, Feb. 1, per 100 lbs.	$1.97½	$2⅛	$1.85

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write us under date of December 17, as follows: Transactions during the fortnight were about 700,000 quintals, at a slight advance in prices. Sales have been effected in 95 per cent for December to January at 6s. 8d.@6s. 8½d.; for late January at 6s. 7d.@6s. 7½d.; February, 6s. 6d.@ 6s. 7d.; March, 6s. 5½d.; April to May, 6s. 3½d., and in 96 per cent, for December, at 6s. 8½d.; June, 6s. 6d., all alongside terms. We estimate the maximum quantity of nitrate that will be exported in the months of January to March at 7,100,000 quintals. The production for the 11 months of 1902 has been 26,932,000 qtls., against 25,887,000 qtls. during the corresponding period of 1901, and the consumption 27,233,000 qtls., against 29,720,000 qtls. in 1901. We quote, 95 per cent, prompt delivery, 6s. 8d.; late January, 6s. 7½d.; February, 6s. 6½d.; March, 6s. 5½d., and refined, January to February, 6s. 9d., all ordinary terms sellers. The price of 6s. 8d., with an all-round freight of 16s. 3d., stands in 8s. 2¾d. per cwt., net cost and freight, without purchasing commission.

Sulphate of Ammonia.—Fertilizer manufacturers are buying more freely at $3.12½ per 100 lbs. for the foreign, and $3.10 for domestic gas liquor for shipment.

Phosphates.—Trade is not active, though shipments are on a fairly good scale. Recently the Palmetto Phosphate Company sent 1,910 tons Florida land pebble to Egypt. It was invoiced at $6 per ton, which is the same value given to Italian ports, although the ocean freight to Egypt is correspondingly higher. At present Continental freights from Florida ports stand at 12s. 3d. ($2.94), which compares with 13s. 6d. ($3.24) quoted in January.

Exports of Florida high-grade phosphate rock from Savannah in January amounted to 7,157 long tons, which compare with 10,021 tons in December and 3,794 tons in January, 1902. Of the shipments this year, 1,187 tons went to Belgium and the balance was intended for Germany.

In January Fernandina shipped only 3,155 tons hard rock, as against 7,950 tons in December and 13,915 tons in January, 1902.

Florida phosphate shipments in 1902 are officially reported at 841,810 long tons, which compares with the estimate of 839,345 tons given in the January 3 issue of the JOURNAL, showing a difference of only 2,465 tons. In 1901 the shipments were 739,676 long tons, showing an increase in 1902 of 102,134 tons, or 13.8 per cent. The shipments in 1902 were distributed as follows, in long tons:

	Foreign.	Domestic.	Total.
Hard rock	489,520	.....	489,520
Land pebble	144,597	200,623	345,220
Peace River	.....	7,070	7,070
Total	634,117	207,693	841,810

The exports, constituting nearly 73 per cent of the total shipments, were destined principally to Germany, Italy and France, while the domestic movement was all in land pebble, chiefly to Maryland and New Jersey.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)	$6.00@$6.50	6@6⅝d.	$9.48@10.07
*Fla. land peb. (68@73%)	3.00@ 3.25	4¾@5d.	6.65@ 7.00
†Tenn., (78@82%) export	3.25@ 3.50	5½@6d.	8.58@ 9.36
†Tenn., 78% domestic	3.00 ...	.....	.....
†Tenn., 75% domestic	2.75@ 3.00	.....	.....
†Tenn., 73@74% domestic	2.30@ 2.40	.....	.....
†Tenn., 70@72% domestic	2.10@ 2.25	.....	.....
‡So. Car. land rock	..@ 3.25	4½@4¾d.	5.67@ 5.98
‡So. Car. river rock	2.75@ 3.00	.....	.....
Algerian (63@68%)	.....	4¾@4⅞d.	6.18@ 6.34
Algerian (58@63%)	.....	4½@4⅝d.	5.40@ 5.55
Algerian (53@58%)	.....	4⅜@4½d.	4.90@ 5.04

* Fernandina, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. Jan. 28.

(Special Report of Joseph P. Brunner & Co.)

The market for sulphate of copper is strong and active, while prices have run up to £19 7s. 6d.@£19 10s. per ton, f. o. b. here, less 5 per cent. With this exception there is little of interest to report as regards the chemical trade.

Soda Ash.—Unchanged. For tierces the nearest range is as follows: Leblanc ash, 48 per cent, £5 15s. @£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton, under price for tierces.

Caustic Soda.—In good demand and steady at late rates; 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent of Europe and a few other export quarters.

Bleaching Powder.—Quiet as regards new business, but manufacturers are busy with deliveries against running contracts. For hardwood, £4 5s.@£4 15s. per ton, net cash, is about nearest range, as to destination.

Chlorate of Potash.—Firmer at 2¾@3d. per lb., net cash for English make, manufacturers quoting the higher figures being rather fully sold on contracts over this year.

Sulphate of Ammonia.—Wanted, and £12 12s. 6d.@ £12 15s. per ton, less 2½ per cent, is now nearest range for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda.—Firm at £9 7s. 6d.@£9 10s. per ton, less 2½ per cent for double bags, f. o. b. here, as to quantity.

METAL MARKET.

New York, Feb. 11.

Gold and Silver Exports and Imports.

At all United States Ports in December and Year.

Metal	December. 1901.	December. 1902.	Year. 1901.	Year. 1902.
Gold:				
Exports	$4,744,123	$2,853,097	$57,783,939	$36,030,570
Imports	2,791,522	2,150,087	54,761,880	44,162,747
Excess.	E. $1,952,601	E. $697,010	E. $3,022,059	I. $8,132,119
Silver:				
Exports	$4,723,439	$5,546,875	$55,638,358	$49,272,954
Imports	2,788,590	2,701,286	31,146,782	26,402,935
Excess.	E $1,934,849	E $2,845,589	E. $24,491,576	E. $22,870,019

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending February 11, and for years from January 1:

Period.	Gold.		Silver.		Total Excess, Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week ...	$10,000	$23,420	$289,253	.....	E. $275,839
1903.....	37,303	646,592	2,053,632	$118,304	E. 1,325,043
1902.....	6,249,530	128,567	5,040,766	133,524	E. 11,018,205
1901.....	9,029,690	344,837	4,305,349	630,661	E. 12,448,541

Financial Notes of the Week.

Business generally continues in good condition. Some relief is felt in consequence of the settlement of the Western coal mining scales for the year, and the knowledge that there will be no strike of the bituminous coal miners. Foreign exchange continues very firm, but there has been no further movement towards gold exports.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending February 7, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts .	$895,289,400	$918,506,000	$924,958,600
Deposits	994,595,900	1,000,681,900	940,180,100
Circulaton	31,231,900	31,301,700	44,175,700
Specie	195,890,400	193,038,700	178,014,800
Legal tenders	73,120,700	75,028,000	75,575,900
Total reserve	$269,011,100	$268,066,700	$253,590,700
Legal requirements...	248,648,475	250,170,475	235,045,025
Balance surplus ...	$20,362,625	$17,896,225	$18,545,675

Changes for the week, this year, were increases of $20,447,900 in loans and discounts, and $8,401,200 in deposits; decreases of $1,009,200 in circulation, $4,657,200 in specie, $2,577,600 in legal tenders, and $9,335,100 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings on the corresponding date last year:

	1902.		1903.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd	$193,038,700	.....	$178,014,800	.....
England ...	181,842,370	.....	173,322,040	.....
France	493,818,225	$220,384,045	503,180,835	$219,359,810
Germany ..	185,990,000	68,790,000	162,725,000	60,185,000
Spain	70,160,000	87,685,000	72,045,000	99,435,000
Neth'l'ds ...	28,655,500	32,237,500	23,488,500	33,254,500
Belgium	15,336,665	7,668,335	15,800,000	7,900,000
Italy	77,985,000	10,616,000	84,505,000	10,858,500
Russia	358,045,000	33,660,000	383,480,000	35,980,000

The returns of the Associated Banks of New York, are of date February 7 and the others February 5, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market shows no new features. India has been a fair buyer. Future of silver as result of the establishment of a gold basis for Mexico is problematical. While the tendency would be to steady exchange, it does not necessarily follow that a level rate of exchange between the silver and gold countries would advance the price of bullion permanently.

The United States Assay Office in New York reports receipts of 36,000 oz. silver for the week.

We regret to say that in consequence of an error in transcribing, the average price of electrolytic copper given in our last issue was slightly too high. The average for the month of January should be 12.159c., instead of 12.163c.

Indian exchange remains firm, and the Council bills offered in London were all taken at an average of 16.06d. per rupee. Business in India continues active, and the demand for money good. Shipments of silver are still light.

The foreign merchandise trade of France for the calendar year is reported by the Ministry of Commerce as below:

	1901.	1902.
Imports	Fr. 4,369,194,000	Fr. 4,415,725,000
Exports	4,012,941,000	4,236,918,000
Excess, imports	Fr. 356,253,000	Fr. 178,807,000

This shows an increase of 46,531,000 fr. in imports; an increase of 223,977,000 fr. in exports; and a resulting decrease of 177,446,000 the balance of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$.37½	$.39½
Peruvian soles and Chilean pesos	.37	.39
Victoria sovereigns.....	4.86	4.88
Twenty francs.....	3.86	3.88
Twenty marks.....	4.74	4.80
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

February.	Sterling Exchange	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton.	Tin, Cts. per lb.	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter S. L., Cts. per lb.
5	4.87	47⅝	22	12⅝ @12¾	12½ @12⅝	56½	29	4.05 @4.10	5.00 @5.05	4 85 @4.87½
				12⅝	12½			4.05	5.00	4 85
6	4.87	47⅜	21 11/16	@12¾	@12⅝	56¾	29¼	@4.10	@5.05	@4.87½
				12⅝	12½			4.05	5.00	4.85
7	4.87	47⅜	21 11/16	@12¾	@12⅝	....	29¼	@4.10	@5.05	@4.87½
								4.05		4 85
9	4.87	47½	21 11/16	12¾	12⅝	56⅞	29½	@4.10	5.05	@4 87½
				12¾	12⅝		29⅝	4.05		4 85
10	4.87¼	47⅞	22⅛	@12⅞	@12¾	57	@29½	@4.10	5.05	@4.87½
				12¾	12⅝		29¼	4.05		4.85
11	4.87¼	47¾	22 1/16	@12⅞	@12¾	57⅛	@29⅜	@4.10	5.05	@4.87½

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper.—During the week under review the market again displayed great strength and a large business has been done for home trade, as well as for export. Manufacturers continue very busy indeed. Prices have again advanced, and at the close we quote lake copper 12¾@12⅞c.; electrolytic in cakes, wirebars or ingots, 12⅝@12¾c.; cathodes, 12⅜@12½c., and casting copper 12⅜@12½c.

The market for standard copper in London, which last week closed at £56 15s., opened on Monday at £56 17s. 6d., and the closing quotations on Wednesday are cabled as £57 2s. 6d.@£57 5s. for spot, and £56 12s, 6d.@£56 15s. for three months prompt.

For refined and manufactured sorts we quote: English tough, £59 10s.@£59 15s.; best selected, £61@£61 10s.; strong sheets, £69@£69 10s.; India sheets, £68@£68 10s.; yellow metal, 6¾@6⅞c.

Exports of copper from Atlantic ports during the week ending February 10 are reported by our special correspondents as follows: Great Britain, 431 long tons; Germany, 400; Holland, 930; Italy, 52; Austria, 20; Russia, 11; Sweden, 10; Brazil, 23; Panama, 32; total, 1,909 tons. Imports were 422 tons copper from Mexico, and 35 tons from Japan; total, 457 tons.

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of December 27, that recent sales of bar copper were 16,573 quintals, at $30.35, Chilean currency, per Spanish quintal, f. o. b. Sales of copper matte were 550 tons, at $27.95@$28 currency per metric quintal, on a basis of 50 per cent copper. No sales of copper are reported; nominal price $3.70 currency per metric quintal, on basis of 10 per cent copper contents.

Tin.—The weaker tendency displayed last week has again given way to a firmer market, in consequence of the higher cables received from London and a good consumptive demand, values improving until 29½c. was reached at the beginning of the week. Since then some concessions have been made, and at the close we quote 29¼@29⅜c. for spot and futures.

The foreign market, which closed last week at £132, advanced on Monday to £133, and the closing quotations on Wednesday are cabled as £132 12s. 6d.@£132 15s. for spot and £133@£133 2s. 6d. for three months prompt.

Lead has been in very good demand. The reduction in the price of desilverized for St. Louis proper made by the American Smelting and Refining Company about ten days ago, from 4.05 to 4c., has caused no change whatever in the general market conditions. At the close we quote 3.95@4c., St. Louis, and 4.05@4.10c., New York.

The foreign market is again firmer, Spanish lead being quoted £11 8s. 9d.@£11 10s., and English lead 2s. 6d. higher.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of January 24, that the price of silver for the week has been 11.50 reales per ounce. Exchange has gone down by 15 centimos, making it 33.50 pesetas to £1. The local quotation for pig lead on wharf has been 60.75 reales per quintal, which on above exchange is equal to £10 2s. 10d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 1,226,596 kgs. to London; 101,000 kilos to Marseilles; a total of 1,327,596 kgs.

Spelter.—The activity reported last week continues, the demand in all lines being very good. Producers have been rather reluctant sellers. At the close we quote St. Louis, 4.85@4.87½c., and New York, 5@5.05c.

The foreign market is somewhat firmer, good ordinaries selling at £20 7s. 6d., and specials £20 12s. 6d.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, that prices continue firm and demand good. Shipments for the week were 250 tons calamine to Hamburg.

Antimony is dull and depressed. We quote Cookson's at 8¼c.; Hallett's, 7c.; Hungarian, Japanese, French, Italian and U. S. Star, 6⅝@6¾c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 42½c. per gram.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is $45.50@$46.50 per flask for domestic orders, and $43@$43.50 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.
No. 1, 99% ingots	33@37c.
No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$1.50
Chromium, pure (N.Y.)	.80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanum (20@25%. N. Y.)	55c.

	Per lb.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Missouri Ore Market. Feb. 7.

(From Our Special Correspondent.)

The market price of zinc ore during the week was generally $32 per ton for ore assaying 60 per cent zinc, and in a few instances $33. The highest price of zinc ore was $35.50 per ton, there being no especial competition for the fancy lots. Lead ore brought $51 per ton, and was in good demand, there being a representative of a St. Louis smelter in the field in addition to the two local smelter representatives. The second lot of 500 tons of zinc concentrates sold for export was to leave the port of Galveston February 9, billed to Antwerp. This will close the export deal. Before it was begun the assay basis price was $28 per ton for 60 per cent zinc. The price paid for the export ore was a basis of $23, the producers suffering a loss of $5 per ton. The price has since advanced. Before exports started the price was going down and purchasing agents predicted it would go to a $25 basis price. Now it is strong.

Following are the shipments from the various camps for the week ending February 7, 1903.

	Zinc. Pounds.	Lead. Pounds.	Total. Value.
Joplin	3,173,120	466,010	$64,240
Carterville-Webb City	1,554,450	462,510	37,326
Galena-Empire	1,220,540	109,340	20,480
Duenweg	640,810	186,630	14,065
Aurora	386,180	18,380	5,652
Carl Junction	346,690	.....	5,720
Zincite	318,730	1,380	5,295
Granby	323,000	30,000	4,686
Prosperity	243,810	18,970	4,380
Carthage	199,560	.....	3,293
Cave Spring	124,700	32,720	2,895
Alba-Neck	104,470	14,660	2,094
Spurgeon-Spring City	125,110	7,040	1,803
Central City	107,180	.....	1,447
District total	8,868,350	1,347,640	$174,283
Total six weeks	52,069,030	6,408,230	$963,539

Zinc value, last week, $140,132; lead value, $34,151; Zinc value, six weeks, $800,966; lead value, $162,573.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	....	24.07	....	4.075	....	4.15
March	....	26.32	....	4.075	....	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September ...	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November ...	....	25.68	....	4.075	....	5.18
December ...	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	.....	12.173	.....	12.378	....	55.16
March	.....	11.882	.....	12.188	....	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.03
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	....	....	25.41	55.09	28.13	61.06
March	....	....	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Amalgamated Copper	Feb. 24	.50	769,430	20,426,126
Arizona Copper, def.	Feb. 25	1.32	83,746	.....
Arizona Copper, pf.	Feb. 25	1.32	417,820	.....
†Calumet & Hecla	Mar. 10	5.00	500,000	80,350,000
*Bald Butte, Mont.	Feb. 15	.06	15,000	1,327,148
*Barreno, Mex.	Feb. 15	.75	1,800	46,148
Cambria Steel, Pa.	Feb. 14	.75	675,000	5,775,000
*Central Lead, Mo.	Feb. 15	.50	5,000	335,000
§Colo. Fuel & Iron pf.	Feb. 20	4.00	80,000	1,560,000
*Daly West, Utah	Feb. 16	.60	108,000	2,475,000
*Empire State, Ida.	Feb. 15	.05	25,277	1,612,216
*Esperanza, Mex.	Feb. 10	3.75	11,250	1,092,789
*Four Oil, Cal.	Feb. 9	.01	2,087	31,105
Golden Eagle, Colo.	Feb. 25	.01½	22,500	93,705
§Houston Oil, pf.	Tex. 26	3.00	224,125	896,500
*Imperial Oil, Cal.	Feb. 15	.02	20,000	300,000
§Jeff. & Clearf. C. & I., pf.	Feb. 15	2.50	37,500	629,500
Mesquital, Mex.	Feb. 1	.06	15,000	51,458
*N. Y. & Hond. Rosario.	Feb. 15	.10	15,000	1,880,000
§Quincy, Mich.	Feb. 16	2.50	250,000	13,820,000
*San Rafael, Aviador, Mex.	Feb. 19	4.50	5,400	.....
*San Rafael, Aviada	Feb. 19	3.00	3,600	.....
*Silver King, Utah	Feb. 10	.66⅔	100,000	6,250,000
*Soledad, Mex.	Feb. 19	1.88	1,805	225,880
Spearfish, pf., S. Dak.	Feb. 1	.01	9,000	18,000
†Standard Con., Cal.	Feb. 24	.10	17,839	4,124,653
*West Shore Oil, Cal.	Feb. 2	.01	5,000	55,000
Yellow Aster, Cal.	Jan. 25	.10	10,000	483,789

*Monthly †Quarterly. §Semi-annual.

ASSESSMENTS.

Name of Company.	Location. No.	Delinq.	Sale.	Amt.
Andes	Nev. ..	Feb. 16	Mar. 13	.10
Badger	Ore. ..	Feb. 13	.....	.10
Burton	Utah 1	Mar. 18	Apr. 3	.001
Challenge Con.	Nev. 35	Feb. 3	Feb. 26	.05
Chollar	Nev. 61	Feb. 18	Mar. 12	.05
Con. Cal. & Va.	Nev. 18	Feb. 18	Mar. 11	.25
Copper Ranch	Utah ..	Feb. 2	Feb. 20	.00¼
Free Silver	Utah ..	Feb. 23	Mar. 21	.00¼
Golden Fleece	Cal. ..	Feb. 24	....	2.00
Jenny Lind	Cal. 16	Feb. 22	Mar. 12	.01½
Justice	Nev. ..	Mar. 6	Mar. 27	.10
Kern River Oil	Cal. ..	Feb. 23	.....	.50
Mazeppa	Cal. ..	Feb. 21	.....	.02
Melcher	Utah 7	Feb. 5	Feb. 23	.01½
Mexican	Nev. 73	Feb. 25	Mar. 19	.10
Mineral Hill	Cal. ..	Feb. 23	.....	.02
Napa County Copper	Cal. ..	Feb. 28	.....	.01
Ophir	Nev. ..	Feb. 4	Feb. 25	.15
Potosi	Nev. 65	Feb. 11	Mar. 4	.05
Savage	Nev. ..	Mar. 5	Mar. 26	.10
Seg. Belcher & Mides Con.	Nev. 30	Feb. 2	Feb. 24	.05
Sierra Nevada	Nev. 128	Feb. 25	Mar. 16	.10
South Swansea	Utah 1	Feb. 3	Feb. 21	.03
Tanana	Cal. 6	Feb. 2	Mar. 2	.10
Tetro	Utah 25	Feb. 28	Mar. 21	.02
Union Con.	Nev. ..	Mar. 10	....	.10
Wabash	Utah ..	Feb. 21	Mar. 12	.05
Yellow Jacket	Nev. 13	Feb. 11	Mar. 19	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb. 5. H.	Feb. 5. L.	Feb. 6. H.	Feb. 6. L.	Feb. 7. H.	Feb. 7. L.	Feb. 9 H.	Feb. 9 L.	Sales
Acacia, Colo	$1					.08½		.08				.08½		5,500
Amalgamated c., Mont	100	68⅜	67½			69⅛	68	69⅛	68	69¼	68⅜	70⅛	69¼	157690
Anaconda c. Mont	25	108¼	105¼			110½	108⅝	110¼	107⅜	109		112⅞	111½	10,000
Anaconda Gold, Colo.	5													
Belcher, Nev.	3							.60						200
Best & Belcher, Nev.	3	2.75												
Breece, Colo	25													
Brunswick, Cal.	1					.06								500
Caledonia, Nev.	2½	2.50												
Chollar, Nev	3					.45		.46	.45			.43	.42	1,100
C. K. & N., Colo	1					.20				.20				1,000
Comstock T., s., Nev.	2	.09												
Comst T Bonds	100	.08½				.08½						.08		3,000
Con. Cal. & Va., g.s. Nev	2½	2 10				2.45		2.00		2 00		2.15		1,050
Cons. Imperial, Colo.	1	.05												
Creede & C. C., Colo.	1													
Cripple Creek c., Colo.	1							.05		.05				2,000
Crown Point, Nev.	3													
Daly, Utah	20					3.75						4 00		40
Elkton g., Colo.	1	.39				.38	.37	.38	.37			.38	.37	1,900
Gold Dollar, Colo.	1													
Gould & Curry, Nev.	3	1.00	.95											
Greene Con., c., Mex.	10	22.75	21.75			22.00	21.63	21.75	21.25	21.75	21.00	22.50	21.38	19,500
Isabella, g., Colo.	1	.28				.26		.25		.25		.25		2,100
Jack Pot, Colo.	1							.12½				.13	.12½	2,530
Julia, Nev.	1													
Justice, Nev.	1													
Mexican, Nev.	3					1.65								400
Moulton, Mont.	25					.28								100
Ontario, Utah	100	6.00										6¼	5⅜	210
Ophir, s., Nev	1	2.55				2.75		2.50		2 35		2.25		900
Pharmacist, Colo.	1							.05½				.05½		3,000
Phœnix, Ariz.	1													
Portland, Colo.	10					1.65		1.60		1 55				500
Potosi, Nev.	3	.70						.60				.65		600
Quicksilver, Cal.	100													
Savage, Nev.	2½													
Sierra Nevada, Nev	3					1.00								200
Tenn. c., Tenn	25	27.50	26.50			28 75	27.50	29.00	27.50	29.00	27.75	30 13	28.00	117700
Union Con., Nev.	2½											1.25	1.20	400
Union Cop., N. C.	10	3.00	2.75					3.25	3.00	3.25	3.13	3.25	3.13	10,600
Utah, Nev.	1													
White Knob, g. s., Ida	100	11.50				11.50		11.75	11.50	12 00	11.75	12.25	12.13	3,300
Work, Colo.	1									.07	.06½			3,000
Yellow Jacket, Nev.	3													

Total sales 360,290 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb. 5. H.	Feb. 5. L.	Feb. 6. H.	Feb. 6. L.	Feb. 7. H.	Feb. 7. L.	Feb. 9. H.	Feb. 9. L.	Sales.
Adventure Con., c.	$25	100,000	14¼	14	14⅜	14⅛	15¼	14¼	16⅜	15⅜	16		16¼	15⅞	4,640
Allouez	25	80,000	5	4⅜	5⅝	4⅜	5⅜	5¼	5⅛	5	5⅛	5¼	6⅜	5½	20,413
Amalgamated, c.	100	1,538,879	68¼	67⅜	69⅜	68⅜	69⅜	68	69½	68	69¼	68⅜	70¼	69¼	30,862
Am. Z. L. & Sm.	25	60,000													
Anaconda, c.	25	1,200,000	27	26½	28	27¾	27½		27¾		27⅛		28⅛	28⅛	825
Arcadian, c.	25	150,000	4½		4⅞	4¼	5	4¾	4¾	4¾	5⅛	4⅞	6⅛	5⅝	27,317
Arnold	25	60,000													
Atlantic, c.	25	100,000	9		9¾	9¼	10	9½	10¼	10	10¼	10	13½	10¼	4,342
Bingham Con., g. s.	50	150,000	35	33½	36	34⅞	37⅝	36⅛	38¼	37	38¾	38	39⅛	38¾	15,165
Bonanza	10	300,000									.80	.75			400
British Columbia	15	250,000					7¼	7¼	7½	6⅝					715
Cal. & Hecla, c.	25	100,000	520		520		530	520	530	525	545	530	550	544	410
Centennial, c.	25	90,000	26	25½	26¼	25⅛	27	25½	27½	26	30	27⅝	31½	30	34,937
Central Oil	25	60,050			7		7		7¾				7¾		723
Con. Mercur, g.	5	1,000,000	1⅜		1⅜		1¾		1¾		1¾	1⅛	1⅜	1⅛	2,916
Continental Zinc	25	22,000			15										10
Copper Range Con.	100	285,000	66½	65⅜	67	66	67½	66½	69	66½	69¼	68⅜	71⅛	69¼	31,754
Daly-West., g. s.	20	180,000	41	40	41½	41	41¾	41½	42	41	41½	41⅛	41¾	41¼	1,155
Dominion Coal	100	150,000							118½						10
Dominion Coal, pf.	100	30,000													
Dominion I & S.	100	100,000	55⅛	54¾	55¼	55	55¼	55	55	53¾	54		54	52½	1,298
Elm River	12	100,000	3⅜	3⅛	3⅜		4⅜	3½	3⅞	3⅜	4¼	4	4¼		6,965
Franklin, c.	25	100,000	10		10½	10¼	11⅝	10½	11½	11¼	12⅜	12	14	12¾	1,609
Guanajuato Con.	5	385,000													
Isle Royale Con., c.	25	150,000	12½	11⅜	14	13⅛	15	13½	15⅞	14	16⅛	15½	17⅜	16⅛	7,219
Mass Con., c.	25	100,000	15¾	15	16	15⅝	17¾	16	18	17	17¾	17½	18	17¼	4,540
Mayflower, c.	25	100,000	2 3/16	2	2¼		2¼	2	2¼	2	2¼	2⅛	2⅛	2¼	2,000
Michigan, c.	25	100,000	10	9¾	9⅛		11	10	11	10½	11		11⅛	11	3,455
Mohawk, c.	25	100,000			54¼	51¼	55	53⅛	55	54	55	54½	57½	56	7,380
Mont. Coal & Coke	25	200,000	7	6¾					6¾		7	6¾			1,150
Mont'l & Boston, c.	5	570,000	2⅛	2			2¼	2	2⅛		2⅛		2¼	2⅛	11,390
National	25	100,000													
New Idria, g.	5	100,000									9				50
Old Colony, c.	25	100,000			2		2	1⅞	2	1¾			2⅛	2	2,061
Old Dominion, c.	25	150,000	20¾	19¾	20⅜	20	20⅞	20⅜	21¼	20⅜	22	21¾	23⅛	22	11,823
Osceola, c.	25	96,150	63	61½	65	63			76	68	75	72½	79	74½	7,408
Parrot, s. c.	10	229,850	30	27½	31	29⅞	31½	31	33¼	30¾	32		33½	32¼	6,430
Phoenix Con., c.	25	100,000			5⅛		5⅛		5⅜	5⅛			6	5⅜	725
Quincy, c.	25	100,000			110		122	120	126½	115	123		125		601
Rhode Island, c.	25	100,000			3¼		3½	3⅜	3¼		3⅜		3¼		885
Santa Fe, g. c.	10	250,000	2⅜	2⅜	2⅛	2⅜	3	2½	3	2⅜	3	2¾	23		4,300
Shannon, c.	10	183,298	10¾		12⅞	11	12¾	12¼	13	12⅛	13	12¾	13⅛	13	11,460
Tamarack, c.	25	60,000	150		150		183	168	190	175	188	105	189½	188	3,054
Tecumseh	25	40,000					1½	1¼					1 13/16	1 5/8	285
Tennessee	25	175,000	27	26½	28⅜	26¾							29½	29	1,420
Trimountain	25	100,000	90½		92	90½			86	91	99		97	95⅛	4,841
Trinity, c.	25	160,000	11¼	10¾	11⅝	11	11¾	11¼	13	11⅝	13¼	12½	14	13	18,338
United Copper	100	450,000					30	28½	30½	30	30¾	29½	30	29⅝	755
United States, g.	25	250,000			26	24¾	26½	25¾	32¾	31	27	26	27½	26¾	45,888
U. S. Coal & Oil	25	240,000	13⅜		14¾	13⅞	15	14¼	15	14¾	15	14¾	15¼	14⅞	8,118
Utah Con., g.	5	300,000	31⅜	29½	32½	31¼	32	31	32¼	31	32	31¼	32⅜	31¾	23,553
Victoria, c.	25	100,000			7¼	6¾	7¾	7¼	8	7½	8¾	7⅞	9	8¾	5,623
Washington	25	60,000			.25										100
Winona, c.	25	100,000	8¾	8	8½	8	8⅝	8¼	9⅛	8¾	9¾	9¼	10¼	9⅝	16,374
Wolverine, c.	25	60,000	68				69¾	68½	70	69	70	69	70	69¼	3,012
Wyandot	25	100,000					1⅝	1½	1¾	1¼	1 13/16	1⅝	2⅛	1¾	2,845

* Boston Stock Exchange. †Ex.—Dividend. Total sales, 403,705 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb. 5. H.	Feb. 5. L.	Feb. 6. H.	Feb. 6. L.	Feb. 7. H.	Feb. 7. L.	Feb 9. H.	Feb 9. L.	Sales
Allis-Chalmers, U. S.	100	18¾						19	18½			18¾		300
Allis-Chalm's, pf, U.S.	100					86		86	85¼	86		70⅝	69¼	
Am. Agr. Chem., U.S.	100	24⅜	24			25	23⅜	25	23					
Am. Agr. Chem. pf, U.S.	100							83						100
Am. Sm. & Ref., U.S.	100	47½	46¾			47¾	47¼	47½	47¼	47¼	47	48¼	47⅜	6,300
Am. Sm. & Ref. pf, U.S.	100	97	95⅞			98	97	97¾	97½	97⅜	97	98⅜	97¼	13,230
Am. Steel & Fdy., U.S.	100									18		18⅜		
Am. S. & Fdy. pf., U.S.	100							66				67		500
Col. Fuel & I., Colo.	100					76½	75⅜	76	74	75	74½	75¼	75	1,700
Col. & H. C. & I., Colo.	100	19				20	19¾	19¾				20¾	20	1,120
Crucible Steel, U. S.	100	22	21½			21¾		21⅝	21⅛	20⅞		20⅞	20⅝	2,465
Crucible Steel, pf, U.S.	100	85⅝	85¼			85½	85⅜	85⅛		85⅜	85⅛	86½	86⅛	978
†Mong. R. Coal, Pa.	100	11⅝				11⅞	11¾							1,020
†Mong. R. Coal pf, Pa	100					39⅝		40	39⅞	40		40		289
National Lead, U.S.	100	29⅜	28			29½	28¾	29	28⅝	28⅛		28⅞	28¼	3,500
National Lead pf, U.S.	100	94	92¾									94½	94	500
†Phila Nat. Gas	100													
†Phila Nat. Gas, pf	100					49						49		300
†Pittsburg Coal, Pa	100	29¼	29⅛			29	28¾	29⅛	28⅛	28⅛		29⅛	28⅛	1,923
†Pittsburg Coal pf, Pa	100	89¾	89⅛			90¼	90	90⅛	90¼			90½	90	1,121
Republic I & S., U.S.	100	21¾	21			22¼	21⅝	22¼	21⅛	21¾	21⅝	22	21¾	9,300
Republic I. & S., pf, U.S.	100	79½	78¾			79⅝	79¼	79½	79⅛	79½		79¾	79⅛	2,400
Sloss-Shef S. & I., Ala.	100	65	66¼			69½	69	70		69½		69		950
Sloss-Shef S. & I. pf, Ala.	100													
Standard Oil, U.S.	100	741	740			740		741	740	742				59
Tenn. C. I. & R. R., Ala.	100	64¼	63			65	64⅛	65¼	64¼	64⅛	64	65½	64¾	17,610
U. S. Red & Ref., U.S.	100											34½		200
U.S. Red & R. pf., U.S.	100													100
U.S. Steel Corp., U.S.	100	38⅝	37¾			39⅜	38¾	39¾	38¾	39¾	38⅝	39¾	39¼	226885
U.S. Steel Corp. pf, U.S.	100	88⅜	87¼			89⅝	88¼	89½	88⅛	89	88⅜	89¼	88¾	60,913
Va.-Car Chem., U.S.	100					64⅞	63½	64⅞	64¾	64⅛	64⅛	64⅝	64¼	6,050
Va.-Car Chem. pf, U.S.	100					127	126	126¾						500
Va. I. C. & Coke, U.S.	100					37	35½					37	36	200

* New York Stock Exchange. † Pittsburg Stock Exchange. Total sales, 709,903 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Feb. 2. H.	Feb. 2. L.	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb. 5. H.	Feb. 5. L.	Feb. 6. H.	Feb. 6. L.	Feb. 7. H.	Feb. 7. L.	Sales
Acacia	$1	.09½	.08¾	.09½	.08¾	.09¼	.09¼	.09⅝	.09⅜	.09½	.09⅜			11,000
Am. Con.	1	.03	.02¾	.03	.02¾	.03	.02½	.02⅝	.02¾	.03	.02⅝			5,000
Anaconda	1	.20¼	.18½	.20	.18¼	.20	.18	.20	.18	.20	.17½			3,500
Ben Hur	1	.02⅝	.02¾	.02⅞	.02⅝	.02¾	.02⅜	.02½	.02	.02¼	.02			4,000
Blue Bell	1	.08½	.07½							.07¼	.08¼			
C. C. & M.	1	.02½	.02¼	.02⅛	.02		.02	.02½	.02	.02½	.02			3,000
C. K. & N.	1	.20⅝		.21	.20¾	.20½	.19⅝	.18⅞	.18	.18	.16½			14,000
C. C. Con.	1	.05½	.05¼	.05¾	.05½	.05⅝	.04⅞	.05⅜	.05	.05	.05			4,000
Coriolanus	1	.03⅜	.03	.04	.03⅛		.03	.04	.03	.04	.03			
Des Moines	1		.02¼	.02¼			.02¼	.02¼		.02½	.02¼			2,500
Dr. Jack Pot	1	.10¼	.09¾	.10¼	.10	.10½	.07⅝	.10¼	.10	.03¼	.02½			6,000
Elkton Con.	1	.37½	.37¼	.38	.37	.38	.36¾	.36¾	.35	.36¾	.36⅜			10,000
El Paso	1	.68½	.67½	.67½	.67	.68	.67	.67¾	.67	.68	.67			5,100
Fannie Rawlings	1	.05¾					.05		.05					
Findley	1	.10½				.10½	.10	.10⅝		.10¾	.10			
Gold Dollar Con.	1	.05½	.05¼	.05⅝	.05⅜	.05¾	.05⅜	.05⅜	.05⅜	.05⅜	.05			11,000
Golden Cycle	1	.74	.72	.75	.72	.75½	.74½	.77	.75	.77	.76¼			10,000
Gold King	1													
Golden Fleece	1						.05		.05	.20	.05			
Gould	1	.04½		.04⅜	.04	.04⅛	.04⅛	.05	.04⅜	.04⅜	.01¼			
Hart	1	.03	.02	.04	.02¼	.04	.02⅜	.04	.02½	.04	.02½			4,000
Isabella	1	.28½	.27½	.28½	.27½	.25	.24¾	.25½	.25¾	.26	.25¾			27,100
Jack Pot	1	.11	.09	.11	.09		.09		.09		.09			
Last Dollar	1					.65		.65		.65				
Lexington	1	.05½	.05	.05¼	.05	.05¼	.05	.05¼	.05	.05¼				3,000
Little Puck	1	.04	.03⅛	.04	.03½	.03⅞	.03⅛	.04	.03¼	.04	.03⅛			
Mollie Gibson	1	.05½			.05½		.05½	.06¼	.05½	.06¼	.05			
Moon Anchor	1	.11	.08	.10	.08½	.11	.08	.11	.08	.11	.07½			
New Haven	1	.03¼	.03	.03⅛	.03	.03⅛	.03	.03⅛	.03					2,000
Pharmacist	1	.05⅛	.04⅝	.04⅞	.04¾	.05	.04⅝	.04⅞	.04⅝	.04⅝	.04⅜			4,000
Pinnacle	1			.02	.01¼		.04		.04	.05	.04¾			
Pointer	1	.02		.02	.01½	.01¾	.01¼	.02		.01¾				
Portland	1	1.65	1.55	1.59	1.45	1.55	1.45	1.42	1.35	1.50				4,000
Prince Albert	1	.03½	.03	.03½	.03	.03¼	.03	.03½	.03	.03⅞	.03½			1,000
Vindicator Con.	1	1.05	1.00	1.00		1.05	1.00	1.05		1.10	1.04			6,200
Work	1	.07½	.07¼	.07½	.07⅜	.07⅜	.07¼	.07¼	.07	.07¼	.07⅛			1,700

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 141,600 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	Feb. 7. H.	Feb. 7. L.	Feb. 9. H.	Feb. 9. L.	Name of Company.	Feb. 7. H.	Feb. 7. L.	Feb. 9. H.	Feb. 9. L.
Acacia	.09½	.09¼	.09½	.09¼	Golden Cycle	.77½	.76½	.77	.76½
Alamo	.04½	.02½	.04¾	.02½	Golden Fleece	.18	.05	.15	.05
Anaconda	.20	.17	.25	.17	Isabella	.25¾	.24¾	.26	.25
Cripple Creek Con.	.05¾	.05⅜	.05½	.05⅜	Jack Pot	.11	.09	.11	.09
C. K. & N.	.21	.19	.19	.18	Last Dollar	.65	.40	.65	.40
Doctor Jack Pot	.10¾	.10	.10¾	.10¼	Mollie Gibson	.06½	.05½	.06½	.05½
Elkton, Con.	.38	.38¼	.37	.36½	Moon Anchor	.11	.08	.11	.08¼
El Paso	.68½	.67	.68½	.67	Pharmacist	.04⅞	.04¾	.04½	.04
Fanny Rawlings	.05	.04	.05	.04	Portland	1.35	1.25	1.45	1.30
Gold Dollar Con	.05⅞	.05½	.05¼	.05⅜	Work				

STOCK QUOTATIONS.

MEXICO*. Jan. 31.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200			
Guananjuato.				
Angustias, Pozos	2,400	5.00	93	100
Cinco Senores y An., aviadoras	2,000	15.00	275	280
Cinco Senores y An., aviada	400	10.00	260	270
Providencia, San Juan de la Luz	6,000	2.00	205	210
Queensland y Australia	300		130	140
Guerrero.				
Garduno y Anexas	7,200		38	60
Hidalgo.				
Amistad y Concordia	9,600	5.30	72½	72
Carmen, aviada	1,100		140	150
Guadalupe Fresnillo mill	1,000		220	300
Guadalupe Fresnillo Mine	1,400		90	110
La Blanca, aviadora	1,536		570	1,060
La Blanca, aviada	768		620	620
La Reina y An., aviadora	5,600			22
Maravillas y An., aviador	1,680			170
Maravillas el Lobo	1,000		150	180
Palma y An., aviador	1,800			12
Real del Monte	2,554	10.00		700
Santa Ana y An., aviadora	1,800		30	35
Santa Ana y An., aviada	600		25	30
Sta. Gertrudis y An., aviadas	9,600		7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80	80½
Santo Tomas Apostol aviadoras	5,100		3	4
San Felipe de Jesus, aviadora	3,600			36
San Felipe de Jesus, aviada	1,200			20
San Rafael y An., Trompillo	1,200	12.00	890	900
San Rafael y An., aviada	1,200	$1.00	$380	$390
Soledad, aviada	960	5.00	330	340
Sorpresa, aviada	960	5.00	270	275
Mexico.				
Alacran	2,400			40
Buen Despacho	3,000		72	80
Dos Estrellas	3,000	30.00	2,190	
La Esperanza (El Oro)	3,000	10.00	1,250	1,270
La Reforma, aviadores	2,000		60	65
Santa Ana, Esperanza	2,400			96
Michoacan.				
Luz de Borda, aviadora	3,000		55	60
Luz de Borda, aviada	1,000		10	15
San Luis Potosi.				
Concepcion y An	3,000		65	75
El Barreno, aviadora	2,000	2.00	55	57
Sta. Maria de la Paz	2,400	10.00	700	740
San Diego y Annexas	2,400	4.00	42	45
Zacatecas.				
Asturiana y An	2,500		45	
Candelaria y Pinos	2,500	10.00	215	320
Esperanza y An	2,400		50	65
Lourdes	2,500			
Luz de Minillas, pagadoras	2,000		30	40
San Carlos y Annexas	2,500	20.00		190
Sta. Maria de Gaud	2,500	10.00	145	155
Miscellaneous.				
Bartolome de Medina	2,000	1.50	73	75
Guadalupe Hacienda	10,000	3.00	255	260
La Luz Hac. (Pachuca)	3,750		230	235
La Reina (Chihuahua)	192			
Naica (Chihuahua)	100		6,000	
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	550
San Francisco Hac	6,000	1.00	40	50
Santa Ana Huantla Morelos	4,000			
Union Hacienda	3,000	5.00	285	380

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	February. 7.	9.	Name of Company.	February. 7.	9.
Belcher	.47	.49	Justice	.12	.14
Best & Belcher	2.75	2.95	Mexican	1.55	1.50
Caledonia	2.00	2.05	Occidental Con	.56	.50
Challenge Con	.56	.50	Ophir	2.30	2.40
Chollar	.43	.41	Overman	.57	.57
Confidence	1.25	1.25	Potosi	.63	.58
Con. Cal. & Va	2.00	2.05	Savage	.63	.44
Con. Imperial	.04	.04	Sierra Nevada	.95	.97
Crown Point	.35	.33	Union Con	1.35	1.35
Gould & Curry	.83	.82	Utah Con	.55	.55
Hale & Norcross	1.20	1.20	Yellow Jacket	.56	.53

SALT LAKE CITY.* Feb. 6.

Name of Company	Shares.	Par Val	High	Low	Sales.	Name of Company.	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.30	.27	2,900	M. Washington			.04½	.04½	1,000
Ben Butler	500,000	1	.07¼	.06¼	11,500	Mammoth	400,000	25	1.50	1.50	200
Bullion-Beck	100,000	10				May Day	400,000	.25	.16	.15	4,350
California	300,000	1	.29	.28½	23,500	N. Y. Bonanza			.24	.15½	43,700
Carisa	500,000	1	.16	.16	300	Ontario	150,000	100			
Century	150,000	1	.90	.90	500	Sacramento	1,000,000	5	.27	.25½	3,850
Con. Mercur	1,000,000	5	1.72	1.69½	4,620	Star Con	500,000	1	.12½	.12½	200
Daly			4.50	3.40	3,396	So. Swansea	300,000	1	.19½	.14	7,250
Daly-Judge	300,000	1	10.37½	10.10	2,070	Sunshine	250,000	10			
Daly-West	180,000	20	40.68	39 00	1,105	Uncle Sam, Con	500,000	1			
Grand Central	250,000	1	5.30	5.15	1,000	Victor	500,000	1	.22	.20	9,600
L. Mammoth	150,000	1				Wabash			.28½	.26¼	5,400
La Reine			.05	.04½	14,900	Yankee Con	500,000	1	.38	.36	2,700

All mines are in Utah. *By our Special Correspondent. Total sales, 142,991 shares.

ST. LOUIS, MO.* Feb. 7.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.	Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.50	$0.70	Columbia Lead, Mo.	$500,000	10	11.00	12.50
Catherine Lead, Mo.	500,000	10	1.50	3.00	Con. Coal, Ill.	500,000	100		
Central Coal & C.	1,875,000	100	66.25	67.50	Doe Run Lead Co.	1,500,000	100	95.00	120.00
Central C. & C., pf.	1,875,000	100	.70	.71	Granite Bimet., Mt.	1,000,000	10	1.02	1.17
Central Lead, Mo.	1,000,000	10	130.00	135.00	St. Joe Lead, Mo.	6,000,000	10	15.50	17.00

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Feb. 3. H.	L.	Feb. 4. H.	L.	Feb. 5. H.	L.	Feb. 6. H.	L.	Feb. 7. H.	L.	Feb. 9. H.	L.	Sales
Am. Alkali, Mich	$50													
Am. Cement	10			8¼		8¼				8½	8¼			224
Cambria Iron, Pa	50							48¾		48¾		48¼		28
Cambria Steel, Pa	50	25	24⅞	25¼		25⅛	25	25⅛	25	25		25¼	25⅛	1,104
Penn. Steel, pfd	100									91	90½	92		356
Susq. I. & S., Pa	5	2⅜		2½		2¼		2⅜	2¼	2⅜	2⅜			1,535
United Gas I., Pa	50	115	114¼	114⅝		114⅜	114½	114¾	114	114	113	113½	113	4,630
Warwick I. & Steel	10			5⅝		5½	5⅜			5 7/16		5½	5	859

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 8,796 shares.

LONDON. Jan. 27.

Name and Country of Company	Authorized Capital.	Par value.	Latest dividend. Amt.	Date	Quotations. Buyers.	Sellers.
	£	£. s. d.	s. d.		£. s. d.	£. s. d.
Alaska-Treadwell, g., Alaska	1,000,000	5 0 0	1 6	Jan., 1902	4 15 0	5 0 0
Anaconda, c. s., Montana	6,000,000	5 0 6	2 0	Nov., 1902	4 18 9	5 1 3
Arizona, c., Def., ord	63,444	1 0 0	4 0	July, 1901	7 0 0	7 10 0
Arizona, pref., ord	316,530	1 0 0	4 0	July, 1902	7 2 6	7 7 6
Camp Bird, g., Colo	1,000,000	1 0 0	0 7½	Dec., 1902	1 10 0	1 10 0
Copiapo, c., Chile	225,000	2 0 0	2 6	Dec., 1901	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	13 9	16 3
Enterprise, g., British Col	200,000	1 0 0			2 6	7 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 10 0	1 12 6
Frontino & Bolivia, g., Colombia	140,000	1 0 0	3 0	July, 1901	17 6	1 0 0
Le Roi, g., British Col	1,000,000	5 0 0	5 0	Nov., 1899	1 12 6	1 15 0
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	16 3	18 9
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	4 0	5 0
Montana, g. s., Montana	660,000	1 0 0	6	April, 1899	1 6	2 6
Mountain, c., Cal.	1,250,000	5 0 0	5 0	April, 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,100,000	1 0 0	6	April, 1902	8 6	9 6
St. John del Rey., g., Brazil	600,000	1 0 0	6	Dec , 1902	14 6	15 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 6	Jan., 1903	5 16 0	5 15 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	10 0	12 6
European:						
Linares, l., Spain	45,000	3 0 0	9	Oct., 1902	3 0 0	3 2 6
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 10 0	3 15 0
Rio Tinto, c., Spain	1,625,000	5 0 0	22 6	Nov., 1902	43 15 0	14 0 0
Rio Tinto, pref., Spain	1,625,000	5 0 0	2 6	Nov., 1902	6 0 0	6 5 0
Tharsis, c., Spain	1,250,000	2 0 0	8 0	May, 1902	4 10 0	4 15 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	500,000	1 0 0	1 6	Jan., 1900	2 2 6	2 5 0
Briseis, Tin, Tasmania	600,000	1 0 0			9 0	10 0
Broken Hill Pr'p., s., N. S. Wales	384,000	8 0	1 0	Aug., 1902	1 11 3	1 12 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	18 6	19 0
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Nov, 1902	10 10 1	10 12 6
Great Fingall Con., W. Australia	124,061	1 0 0	5 0	Sept , 1902	7 15 0	7 17 6
Great Bo'd'r Pr'p., W. Australia	175,000	2 0	6	Oct., 1902	1 12 6	1 13 0
Ivanhoe Gold Corp. W. Australia	1,000,000	5 0 0	4 0	Jan., 1903	9 5 0	9 15 0
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Oct., 1902	4 11 3	4 13 9
Lake View Cons., g., W. Australia	250,000	1 0 0	5 0	Nov., 1901	3 3 9	3 6 3
Mt. Lyell M. & R. I., c., Tasmania	825,000	3 0 0	1 0	Dec., 1902	2 8 9	2 11 3
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Jan., 1902	4 2 6	4 7 7
Waihi, g., New Zealand	497,412	1 0 0	2 6	Dec., 1902	5 1 3	5 3 9
Indian:						
Champion Reef, g., Colar Fields	236,500	10 0	2 0	Sept., 1902	6 8 9	6 11 3
Mysore Gold, Colar Fields	265,000	10 0	4 0	Nov., 1902	6 18 9	7 1 3
Nundydroog, g., Colar Fields	242,000	10 0	1 3	Nov., 1902	2 2 6	2 5 0
Ooregum, g., Colar Fields	171,500	10 0	1 3	Dec., 1902	1 10 0	1 12 6
Ooregum, pref., g., Colar Fields	120,000	10 0	1 3	Dec., 1902	1 18 9	2 1 3
African:						
Angelo, g, Transvaal	275,000	1 0 0	6 0	Jan., 1903	7 7 6	7 12 6
British South Africa	5,000,000	1 0 0	rts.	May, 1899	3 7 6	3 8 9
Cape Copper, S. Africa	600,000	2 0 0	2 3	Dec., 1902	2 12 6	2 17 6
Cape Copper, pref., S. Africa	150,000	2 0 0	2 3	Dec., 1902	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	1,360,000	4 0 0	3 0	Aug., 1899	6 13 9	6 16 3
Crown Reef, g., Transvaal	120,000	1 0 0	10 0	Oct., 1902	17 10 0	18 0 0
De Beers Con., d., pref., Cape Colony	2,000,000	2 10 0	10 0	Jan., 1903	19 12 6	19 15 0
De Beers Con., def	2,100,000	2 10 0	12 6	Jan., 1903	22 3 9	22 6 3
East Rand Estates, Transvaal	400,000	1 0 0			5 11 3	5 13 9
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	8 6 3	8 8 9
Ferreira g., Transvaal	90,000	1 0 0	20 0	Jan., 1903	24 0 0	24 10 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 17 6	7 0 0
Geduld, g, Transvaal	400,000	1 0 0	rts.	May, 1902	7 7 6	7 10 0
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 7 6	9 12 6
Jagersfontein, d., Orange F. S	1,000,000	5 0 0	6 0	Nov., 1899	26 17 6	27 2 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	July, 1899	5 15 0	6 5 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	4 2 6	4 7 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 5 0	4 7 6
May Con., g., Transvaal	290,000	1 0 0	3 0	Feb., 1903	4 11 3	4 13 9
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 17 6	6 2 6
Namaqua, c., Cape Colony	200,000	2 0 0	2 0	June, 1902	2 17 6	3 2 6
Primrose (New), g., Transvaal	300,000	1 0 0	2 0	Feb., 1903	4 0 0	4 1 3
Rand Mines, g., S. Africa	448,989	5 0	4 0	Aug., 1902	11 0 0	11 2 6
Robinson, g., Transvaal	2,750,000	5 0 0	6 0	Feb., 1903	10 17 6	11 2 6
Robinson Deep, g., Transvaal	550,000	1 0 0	5 0	May, 1899	5 7 6	5 10 0
Rose Deep, Transvaal	425,000	1 0 0	1 11	Feb., 4, 1903	9 5 0	9 10 0
Salisbury, g., Transvaal	93,000	1 0 0	2 0	Mar., 1899	2 15 0	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 5 0	1 6 3
Wemmer, Transvaal	80,000	1 0 0	15	July, 1902	13 5 0	13 15 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Feb. 4. £.	s.	d.	Feb. 10 £.	s.	d.	Name of Company	Feb. 4. £	s.	d.	Feb. 10. £.	s.	d.
Anaconda	5	15	0	5	17	6	Johannesburg Invest	3	10	0	3	8	9
British South Africa	3	8	9	3	8	9	Modderfontein	11	1	3	10	18	9
Camp Bird	1	10	9	1	9	6	Rand Mines	11	3	9	11	3	9
Con. Gold-Fields	8	1	3	8	0	0	Rio Tinto com	45	13	9	46	0	0
De Beers Con. def	22	7	6	22	0	0	Simmer & Jack	1	16	3	1	18	0
East Rand	8	6	3	8	6	3	Tomboy	2	2	6	2	2	6
Jagersfontein	27	0	0	26	15	0							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Jan. 21.

Name of Company.	Country.	Product.	Capital Stock.	Par value.	Latest divs.	Prices. Opening.	Closing
			Francs.	Fr.	Fr.	Fr.	Fr.
Boleo	Lower Cal.	Copper		500	176.00	1,200.00	1,270.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	24.00	22.50
Fraser River	Brit. Col'mb.	Gold	250,000	25		6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	85.50	87.25
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	450.00	458.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	445.00	463.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25		1.00	1.00
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	617.00	620.00

TORONTO, ONT.* Feb. 9.

Name of Company.	par val	Prices. High.	Low.	Sales.	Name of Company	Par val	Prices. High.	Low.	Sales.
Black Tail	$1	.08	.04		Granby Smelter	$100	550	410	
Cariboo (Mc. K.)	1	.18	.16		Mountain Lion	1	.18	.11	
Cariboo (Hyd.)	1	.75			North Star	1	.15	.10	
Center Star	1	.36	.33	3,000	Nova Scotia Steel, com	100	109½	108	
Crows Nest, C	100	400	300		Payne	1	.22	.11	10,500
Dominion Coal, com	100	130¾	129		Rambler Cariboo	1	.35	.29	
Dominion S. & I	100	53¾	54		Republic	1	.07½	.06	3,000
Dominion S. & I., pref	100				St. Eugene	1	.40	.27	
Fairview	1	.05½	.04	3,000	Virtue	1	.09	.06	
Giant	1	.03¾	.02¼		War Eagle Con	1	.19½	.17	

*Standard Stock and Mining Exchange. Total sales 19,500 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

	Cust.	Meas.	Price.
ABRASIVES—			
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.		$0.08
Grains	"		.10
Corundum, N. C.	"		.07@.10
Chester, Mass.	"		.04½@.05
Barry's Bay, Ont.	"		.07½@.09½
Mont., car-lots, f.o.b., Chicago	"		.07@.07½
Crushed Steel, f.o.b. Pittsburg	"		.05½
Emery, Turkish flour in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Naxos flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Chester flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"		.01½
Grains, in kegs	"		.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton		26.50@30.00
Kuluk (Turkey)	"		22.00@24.00
Naxos (Greek) h. gr.	"		26.00
Garnet, as per quality	sh.ton		25.00@35.00
Pumice Stone, Am. Powd	lb.		.01⅝@.02
Italian, powdered	"		.01½
Lump, per quality	"		.04@.40
Rottenstone, ground	"		.02½@.04½
Lump, per quality	"		.06@.20
Rouge, per quality	"		.10@.30
Steel Emery, f.o.b. Pittsburg.	"		.07
ACIDS—			
Boracic, crystals	"		.10¾@.11
Powdered	"		.11¼@.11½
Carbonic, liquid gas	"		.12½
Chromic, crude	"		.20
Hydrofluoric, 30%	"		.03
48%	"		.05
60%	"		.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"		.06
ALCOHOL—Grain	gal.		2.43@2.45
Refined wood 95@97%	"		.00@.65
Purified	"		1.20@1.50
ALUM—Lump	100 lbs.		1.75
Ground	"		1.80
Powdered	"		3.00
Chrome, com'l	"		2.75@3.00
ALUMINUM—			
Nitrate	lb.		1.50
Oxide, com'l, common	"		.06½
Best	"		.20
Pure	"		.80
Hydrated	100 lbs.		2.60
Sulphate, pure	"		1.50@2.00
Com'l	"		1.50@2.00
AMMONIA—			
Aqua, 16°	lb.		.03
18°	"		.03¼
20°	"		.03¾
26°	"		.05½
AMMONIUM—			
Carbonate, lump	"		.07¼
Powdered	"		.08fff
Muriate	"		.05⅝
Lump	"		.08¼
Nitrate, white pure (99%)	"		.12
Phosphate, com'l	"		.09
Pure	"		.12
ANTIMONY—Glass	"		.30@.40
Needle, lump	"		.05½@.06
Powdered, ordinary	"		.05¾@.07¼
Oxide, com'l white, 95%	"		.09½
Com'l white, 95%	"		.12
Com'l gray	"		.07
Sulphuret, com'l	"		.16
ARSENIC—White powd.	"		.02¾@.03½
Red	"		.06¾@.07
ASPHALTUM—			
Ventura, Cal.	sh.ton		32.00
Cuban	lb.		.01½@.03½
Egyptian, crude	"		.05½@.06
Trinidad, refined	sh.ton		35.00
San Valentino (Italian)	lg.ton		16.00
Seyssel (French), mastic	sh.ton		21.00
Gilsonite, Utah, ordinary	lb.		.03
Select	"		.03¾
BARIUM—			
Carb. Lump, 80@90%	sh.ton		25.00@27.50
92@98%	"		26.00@29.00
Powdered, 80@90%	lb.		.01¾@.02
Chloride, com'l	100lbs.		1.67½@1.76
Chem. pure cryst	lb.		.05
Nitrate, powdered	"		.05½

BARIUM	Cust.	Meas.	Price.
Oxide, Am. hyd. cryst.	lb.		$0.02¾
Sulphate (Blanc Fixe)	"		.02
BARYTES—			
Am. Crude, No. 1	sh.ton		9.00
Crude, No. 2	"		8.00
Crude, No. 3	"		7.75
German, gray	"		14.50
Snow white	"		17.00
BAUXITE—Ga. or Ala. Mines:			
First Grade	lg.ton		5.50
Second grade	"		4.75
BISMUTH—Subnitrate	lb.		1.40
Subcarbonate	"		1.65
BITUMEN—"B"	"		.03½
"A"	"		.05
BONE ASH	"		.02¼@.02½
BORAX	"		.07¼@.07½
BROMINE	"		.35
CADMIUM—Metallic	"		1.40
Sulphate	100 lbs.		2.00@2.50
CALCIUM—Acetate, gray	"		1.30
" brown	"		.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton		70.00
Carbonate, ppt.	lb.		.05
Chloride	100 lbs.		.70@.90
CEMENT—			
Portland, Am., 400 lbs.	bbl.		1.70@1.90
Foreign	"		1.65@2.25
"Rosendale," 300 lbs	"		.75
Slag cement, imported	"		1.65
CERESINE—			
Orange and Yellow	lb.		.12½
White	"		.13½
CHALK—Lump, bulk	sh.ton		2.50
Ppt. per quality	lb.		.03¾@.06
CHLORINE—Liquid	"		.30
Water	"		.10
CHROME ORE—			
(50% ch.) ex-ship N. Y.	lg.ton		24.75
Bricks f.o.b. Pittsburg	M		175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton		8.00
Am. best, ex-dock, N. Y.	"		9.00
English, common	"		12.00
Best grade	"		17.00
Fire Clay, ordinary	sh.ton		4.25
Best	"		6.00
Slip Clay	"		5.00
COAL TAR PITCH	gal.		.08
COBALT—Carbonate	lb.		1.75
Nitrate	"		1.50
Oxide—Black	"		2.26@2.30
Gray	"		2.28@2.40
Smalt, blue ordinary	"		.06
Best	"		.20
COPPERAS—in bulk	100 lbs.		.42½
In bbls	"		.47½
COPPER—Carbonate	lb.		.18@.19
Chloride	"		.25
Nitrate, crystals	"		.35
Oxide, com'l	"		.19
CRYOLITE	"		.06¼
EXPLOSIVES—			
Blasting powder, A	25 lb. keg		.65
Blasting powder, B	"		1.40
"Rackarock," A	lb.		.25
"Rackarock" B	"		.18
Judson R.R. powder	"		.10
Dynamite (20% nitro-glycerine)	"		.13
(30% nitro-glycerine)	"		.14
(40% nitro-glycerine)	"		.15
(50% nitro-glycerine)	"		.16½
(60% nitro-glycerine)	"		.18
(75% nitro-glycerine)	"		.21
Glycerine for ultro, (32-2-10° Be.)	"		.13¾@.13¾
FELDSPAR—Ground	sh.ton		8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton		14.75
French, Best	"		11.75
FLUORSPAR—			
Am. lump. 1st grade	sh.ton		14.40
2d grade	"		13.90
Gravel and crushed, 1st gr	"		13.40
2d grade	"		12.40
Ground, 1st grade	"		17.90
Ground, 2d grade	"		16.50
Foreign, lump	"		8.00@12.00
Ground	"		11.50@14.00
FULLER'S EARTH—Lump	100 lbs.		.75
Powdered	"		.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust.	Meas.	Price.
	sh.ton		$8.00
Pulverized	"		30.00
German, com. pulv.	lb.		.01¼@.01½
Best pulverized	"		.01½@.02
Ceylon, common pulv.	"		.02¾@.03½
Best pulverized	"		.04@.08
Italian, pulv.	"		.01fff
GYPSUM—Ground	sh.ton		8.00@8.50
Fertilizer	"		7.00
Rock	lg.ton		4.00
English and French	"		14.00@16.00
INFUSORIAL EARTH—Gr'd.			
American best	"		20.00
French	"		37.50
German	"		40.00
IODINE—Crude	100 lbs.		2.45
IRON—Muriate	lb.		.05
Nitrate, com'l	"		.01¼
True	"		.04
Oxide, pure copperas color.	"		.05@.10
Purple-brown	"		.02
Venetian red	"		.01@.01½
Scale	"		.01@.03
KAOLIN—(See China Clay.)			
KRYOLITH—(See Cryolite.)			
LEAD—Acetate, white	"		.08@.08¼
Brown	"		.06@.06¼
Nitrate, com'l	"		.06½
" gran.	"		.08¼
LIME—Com., abt. 250 lbs.	bbl.		.80
Finishing	"		.90
MAGNESITE—Greece.			
Crude (95%)	lg.ton		6.00@6.50
Calcined	sh.ton		17.50@18.00
Bricks	M		170.00
Am. Bricks, f.o.b. Pittsburg	"		175.00
MAGNESIUM—			
Carbonate, light, fine pd.	lb.		.05
Blocks	"		.07@.00
Chloride, com'l	"		.01¾
Fused	"		.20
Nitrate	"		.60
Sulphate	100 lbs.		.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.		.01¼@.01½
Crude pow'd. 75@85% binoxide	"		.01½@.02¼
85@90% binoxide	"		.02¼@.03¼
90@95% binoxide	"		.03¼@.05½
Carbonate	"		.16@.20
Chloride	"		.04
Ore, 50%, Foreign	unit		.18@.19
Domestic	"		.30
MARBLE—Flour	sh.ton		6.00@7.00
MERCURY—Bichloride	lb.		.77
MICA—N. Y. gr'nd, coarse.	sh.ton		33.00@38.00
Fine	lb.		.00¾@.02
Sheets, N. C., 2x4 in.	"		.30
3x3 in.	"		.80
3x4 in.	"		1.50
4x4 in.	"		2.00
6x6 in.	"		3.00
MINERAL WOOL—			
Slag, ordinary	sh.ton		19.00
Selected	"		25.00
Rock, ordinary	"		32.00
Selected	"		40.00
NICKEL Oxide, No. 1	lb.		1.00
No. 2	"		.60
Sulphate	"		.20@.21
OILS—Black, reduced 29 gr.:			
25@30, cold test	gal.		.11½@.12½
15, cold test	"		.12½@.12¾
Zero	"		.13½@.13¾
Summer	"		.11@.12
Cylinder, dark steam ref.	"		.10¼@.11¾
Dark, filtered	"		.15½@.17½
Light, filtered	"		.16½@.19
Extra cold test	"		.27½@.31½
Gasoline, 86°@90°	"		.15@.20
Naphtha, crude, 68°@72°	bbl.		9.05
"Stove"	gal.		.12½
Linseed, domestic raw	"		.45@.46
Boiled	"		.48
Calcutta, raw	"		.75
OZOKERITE	lb.		.11½
PAINTS AND COLORS—			
Chrome green, common	"		.05
Pure	"		.16
Yellow, common	"		.10¼
Best	"		.25
Lampblack, com'l	"		.04½
Refined	"		.07
Litharge, Am. pow'd	"		.04¾@.05½
English flake	"		.08¼@.08½
Glassmakers'	"		.07¼@.08

PAINTS AND COLORS—	Cust.	Meas.	Price.
Metallic, brown	sh.ton		$19.00
Red	"		16.00
Ocher, Am. common	"		9.25@10.00
Best	"		21.25@25.00
Dutch, washed	lb.		.04¾
French, washed	"		.01½@.01⅞
Orange mineral, Am.	"		.07¾@.08
Foreign, as to make	"		.08¼@.11¼
Paris green, pure, bulk	"		.10¾@.11
Red lead, American	"		.05¾@.06
Foreign	"		.06¾@.08
Turpentine, spirits	gal.		.66½@.67
White lead, Am., dry	lb.		.04½@.04¾
American, in oil	"		.05½@.05¾
Foreign, in oil	"		.06⅞@.09¼
Zinc, white, Am., ex dry.	"		.04¾@.04¾
American, red seal	"		.06½
Green seal	"		.07
Foreign, red seal, dry	"		.05¾@.08¼
Green seal, dry	"		.06½@.09½
POTASH			
Caustic, ordinary	"		.04½@.04⅞
Elect. (90%)	"		.06¼
POTASSIUM—			
Bicarbonate cryst	"		.08¼
Powdered or gran.	"		.14
Bichromate, Am.	"		.08½@.08¾
Scotch	"		.08½@.09
Bromide	"		.22
Carbonate (80@85%)	"		.02¾@.03
Chromate	"		.35
Cyanide (98@99%)	"		.20@.21½
Kainit	lg.ton		9.05
Manure salt, 20%	100 lbs.		.66
D'le Manure Salt, 48@53%	"		1.12
Muriate, 80@85%	"		1.83
95%	"		1.86
Permanganate	lb.		.09¼@.10
Prussiate, yellow	"		.13@.13¼
Red	"		.33
Sulphate, 90%	100lbs.		2.11
96%	"		2.14
Sylvanit	unit		.39¼
QUARTZ—(See Silica).			
SALT—N. Y. com. fine	280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton		4.40
SALTPETRE—Crude	100lbs.		3.37½@3.40
Refined	"		4.25@4.62½
SILICA—Best foreign	lg.ton		10.00@11.00
Ground quartz, ord	sh.ton		6.00@8.00
Best	"		12.00@13.00
Lump quartz	"		2.50@4.00
Glass sand	"		2.75
SILVER—Chloride	oz.		.65
Nitrate	"		.30
Oxide	"		.85@1.10
SODIUM—			
Bichromate	lb.		.06¼
Chlorate, com'l	"		.07@.07¾
Hyposulphite, Am.	100 lbs.		1.60@1.65
German	"		1.70@1.90
Peroxide	lb.		.45
Phosphate	"		.02¼@.02¼
Prussiate	"		.09¾
Silicate, conc.	"		.06
Com'l	"		.01
Sulphate, com'l	100 lb.		.75@82½
Sulphide	lb.		.01¼
Sulphite crystals	"		.02¼
SULPHUR—Roll	100 lbs.		1.85
Flour	"		1.90
Flowers, sublimed	"		2.15
TALC—N. C., 1st grade	sh.ton		13.75
N. Y., Fibrous, best	"		10.20
French, best	100 lbs.		1.25
Italian, best	"		1.62½
TAR—Regular	bbl.		2.20
Oil barrels	"		4.20
TIN—Crystals	lb.		.22
Oxide	"		.45
URANIUM—Oxide	"		2.25@3.00
ZINC—Metallic, ch. pure	"		.07@.09¾
Carbonate, ppt.	"		.09
Chloride solution, com'l	"		.02¼
Chloride granular	"		.04¼@.04¾
Dust	"		.04⅜@.04½
Sulphate	"		.02½@.02¾

THE RARE EARTHS.

BORON—Nitrate	lb.		$1.50
CALCIUM—Tungstate (Scheelite)	"		.60
CERIUM—Nitrate	"		10.00
DIDYMIUM—Nitrate	"		35.00
ERBIUM—Nitrate	"		40.00
GLUCINUM—Nitrate	"		20.00
LANTHANUM—Nitrate	"		30.00
LITHIUM—Nitrate	oz.		.60
STRONTIUM—Nitrate	lb.		.07@.07¾
THORIUM—Nitrate 49@50%.	"		4.50
URANIUM—Nitrate	oz.		.25
YTTRIUM—Nitrate	lb.		40.00
ZIRCONIUM—Nitrate	"		8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING additions which they may consider advisable.